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COMMISSION ON SCIENCE AND TECHNOLOGY
FOR DEVELOPMENT

Fifth session

Geneva, 28 May 2001

Item 1 of the provisional agenda

ADOPTION OF THE AGENDA AND OTHER ORGANIZATIONAL MATTERS

Provisional agenda

1. Adoption of the agenda and other organizational matters
2. Substantive theme: "National capacity-building in biotechnology", with particular attention to agriculture and the agro-industry, health and the environment. The theme will include: human resource development through basic science education, research and development, as well as their interdisciplinary aspects; the transfer, commercialization and diffusion of technology; increasing public awareness and participation in science policy-making; and bioethics, biosafety, biodiversity, and the legal and regulatory matters affecting these issues to ensure equitable treatment.
3. Comprehensive note on implementation and progress made on decisions taken at the fourth session of the Commission
4. Presentation of country reports on technology and innovation policies
5. Budget of the Commission
6. Activities of the Commission regarding the coordination of science and technology for development and other inter-sessional activities
7. Election of the Chairperson and other officers for the sixth session of the Commission
8. Provisional agenda and organization of work of the sixth session of the Commission
9. Other matters
10. Adoption of the report of the Commission on its fifth session.

Annotations

Item 1. Adoption of the agenda and other organizational matters

1. The provisional agenda and the related documentation to be prepared for the fifth session of the Commission were approved by the Economic and Social Council (ECOSOC) at its 1999 substantive session in decision 1999/274.

2. It might be recalled that, pursuant to ECOSOC resolutions 1998/46 and 1998/47, the current membership of the Commission was elected on 16 December 1998 and on 5 February 1999. Other elections took place in 2000 and in early 2001. As a result of the 2000 election, the Russian Federation and Slovakia were re-elected in the Eastern European Group, and Austria and Spain were re-elected in the Western European and other States Group for a new term of four years ending in 2003. In the Latin American and Caribbean Group, Brazil and Jamaica were re-elected, whereas Grenada was newly elected to replace Cuba for a new term of four years, ending in 2003. In the African Group, Cameroon and Ghana were re-elected for a new term of four years, ending in 2003. Further, on 26 January 2001, ECOSOC elected Algeria and Sierra Leone for a term of four years ending in 2004, replacing Guinea and the United Republic of Tanzania, whose terms ended in 31 December 2000. At the time of the preparation of the annotated agenda, three members from the Asian Group and two members for the Western European and other States Group had not yet been elected to replace the Republic of Korea, Philippines, Sri Lanka, the United Kingdom and the United States, whose membership in the CSTD expired on 31 December 2000.

3. It should be noted that the Commission, at its fourth session, elected its Bureau for the fifth session. The Bureau is thus composed of the following:

Chairperson: Mr. Stefan Moravek (Slovakia)

Vice-Chairperson: Mr. Bernd Michael Rode (Austria)
Mr. Pedro Teta (Angola)
Mr. Hossein Salar Amoli (Islamic Republic of Iran)
Mr. José Luis Villaveces Cardoso (Colombia)

4. As at previous sessions of the Commission, one of the Vice-Chairpersons should also serve as Rapporteur.

Item 2. Substantive theme: "National capacity-building in biotechnology"

5. The Economic and Social Council, in its resolution 1999/61, decided that the main substantive theme of the Commission for its inter-sessional period 1999-2001 would be "National capacity-building in Biotechnology", with particular attention to agriculture and the

agro-industry, health and the environment. The theme would include human resource development through basic science education, research and development, as well as their interdisciplinary aspects; the transfer, commercialization and diffusion of technology; increasing public awareness and participation in science policy-making; and bioethics, biosafety, biodiversity, and the legal and regulatory matters affecting these issues to ensure equitable treatment.

Documentation

1. Synthesis report on the CSTD panels on national capacity-building in biotechnology: Report by the Secretary-General (E/CN.16/2001/2);
2. Report of the Panel on Capacity-Building in Biotechnology (E/CN.16/2001/Misc. 1);
3. Report of the Panel on Legal and Regulatory Issues in Biotechnology (E/CN.16/2001/Misc. 2);
4. Report of the Panel on Public Awareness and Participation in Science Policy-Making in Biotechnology (E/CN.16/2001/Misc. 3)

Item 3. Comprehensive note on implementation and progress made on decisions taken at the fourth session

6. The Council, in its resolution 1999/61, requested the secretariat of the Commission to (a) identify and analyse best practices in partnering and networking; and (b) build an inventory of opportunities for international science and technology partnerships and networking.

7. In order to better promote science and technology partnerships, the Council recommended that the Commission collaborate more closely with United Nations bodies and specialized agencies of the United Nations system, in particular the United Nations Conference on Trade and Development, the United Nations Development Programme, the Food and Agriculture Organization of the United Nations, the United Nations Educational, Scientific and Cultural Organization, the World Health Organization, the World Bank, the World Intellectual Property Organization and the United Nations Industrial Development Organization.

8. With regard to biotechnology for food production, the Council, in its resolution 1999/61, recommended that the Commission, through its secretariat, initiate a dialogue that involves the private and the public sectors, non-governmental organizations and specialized biotechnology centres and networks, with a view to fostering the exchange of information and ideas among scientists, policy makers, representatives of industry and end-users. Such a dialogue could provide a forum in which to raise issues concerning global developments in biotechnology and to raise public awareness and create better understanding of the potential benefits of biotechnology and other critical issues.

9. The Council, in its resolution 1999/61, requested the secretariat of the Commission: (a) to assist in identifying and disseminating balanced information on biotechnology, intellectual property rights and biosafety; and (b) to examine case studies of approaches to address issues

related to technology, intellectual property rights and biosafety issues in a practical, understandable and concrete way.

10. It also requested the Commission to collaborate with the United Nations Conference on Trade and Development in preparing the next issue of the Advanced Technology Assessment System bulletin on biotechnology for food production.

11. Finally, the Council recommended that the Commission and its secretariat cooperate with other international and regional organizations active in biotechnology, non-governmental organizations and other international institutions, to build understanding and to exchange information on biosafety regulation and capacity-building, including through case studies on (a) partnerships in biotechnology, (b) biosafety, (c) bioethics and (d) approaches to biotechnology and intellectual property rights issues.

12. With regard to the coalition of resources, the Council requested the secretariat of the Commission to finalize the publication of the reports on the coalition of resources for the application of information and communication technologies in transmission infrastructure, education and health, and to ensure the widest possible dissemination of the final report.

Documentation

1. Comprehensive note on implementation and progress made on decisions taken at the fourth session of the Commission (E/CN.16/2001/3);
2. Partnerships and networking in science and technology for development (E/CN.16/2001/Misc. 4);
3. Balanced information on biotechnology (E/CN.16/2001/Misc. 7)
4. Changing dynamics of global computer software and services industry: implications for developing countries (E/CN.16/2001/Misc. 5);
5. Synthesis report on the workshop on coalition of resources (E/CN.16/2001/Misc. 6)

Item 4. Presentation of country reports on technology and innovation policies

13. The Economic and Social Council, in its resolution 1999/61, recommended that the Commission continue to liaise with the United Nations Conference on Trade and Development on science, technology and innovation policy reviews with interested countries in order to identify options for national action, especially those that foster technological capability and innovation and the transfer and diffusion of technology. A country review for Ethiopia will be presented to the Commission.

Item 5. Budget of the Commission

14. In its resolution 1997/62, ECOSOC recommended that at future sessions of the

Commission, the report on the budget and inter-sessional activities of the Commission be considered under a separate agenda item.

Documentation

Note by the secretariat on the budget and inter-sessional activities of the Commission (E/CN.16/2001/4)

Item 6. Activities of the Commission regarding the coordination of science and technology for development and other inter-sessional activities

15. In its resolution 1999/61, the Economic and Social Council urged the secretariat of the Commission, in collaboration with other United Nations bodies, to establish an electronic network linking information on their activities in science and technology for development and to build awareness of scientific developments that are particularly important for fostering economic and social development. ECOSOC also requested the secretariat to continue to issue the regular newsletter updating activities in the United Nations system pertaining to science and technology for development, including information on plans for and the results of the inter-sessional activities of the Commission.

16. The Council further called upon the secretariat and the Bureau of the Commission to identify and take advantage of opportunities to interact closely with bodies of the United Nations system in order to promote greater information exchange and coordination of activities in science and technology for development.

17. The Council also recommended that every other year one panel meeting should be held in Geneva in order to enable the Bureau of the Commission to meet the Geneva-based delegations of member States and observers for one day to discuss with the delegations the status of the inter-sessional activities of the Commission and its efforts to coordinate activities of the United Nations system pertaining to science and technology for development.

18. Finally, the Council agreed to include in the CSTD agenda the item entitled "Functioning of the Commission on Science and Technology for Development, including its role in coordinating science and technology for development", and requested the secretariat of the Commission to prepare a succinct analytical report on relevant activities within the United Nations system, including the outcome of the World Science Conference, for consideration under this item.

Documentation

Note by the secretariat on the activities of the Commission regarding the coordination of science and technology for development and relevant activities within the United Nations system, including the outcome of the World Science Conference (E/CN.16/2001/5)

Item 7. Election of the Chairperson and other officers for the sixth session of the Commission

19. The Commission may wish to follow the practice adopted at its previous sessions of electing a Chairperson and four Vice-Chairpersons for its sixth session. It is understood that one of the Vice-Chairpersons would also serve as Rapporteur.

Item 8. Provisional agenda and organization of work of the sixth session of the Commission

20. The Commission will have before it a note by the secretariat on the provisional agenda for its sixth session, the documents to be submitted under each item and the organization of its work.

Item 9. Other matters

Item 10. Adoption of the report of the Commission on its fifth session

21. In accordance with General Assembly resolution 46/235 and Economic and Social Council decision 1992/218, the Commission on Science and Technology for Development submits its report to the Council.



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Fifth session

Geneva, 28 May 2001

Item 1 of the provisional agenda

ADOPTION OF THE AGENDA AND OTHER ORGANIZATIONAL MATTERS

Organization of work of the session

Note by the secretariat

1. The draft organization of work for the fifth session of the Commission on Science and Technology for Development, annexed to the present note, has been prepared to facilitate the consideration of agenda items within the time-frame available and in accordance with the conference services allocated to the Commission.
2. The draft is based on the provisional agenda for the current session, which was adopted by the Commission at its fourth session and approved by the Economic and Social Council at its 1999 substantive session in decision 1999/274. The provisional agenda is circulated in document E/CN.16/2001/1.
3. The time-table below should be considered indicative. Should the Commission complete the general discussion on an item before the date shown, it might wish to move immediately to the next item.
4. The Commission is scheduled to meet from Monday, 28 May, to Friday, 1 June 2001. Arrangements have been made to hold morning and afternoon meetings during the session. The morning meetings will be held from 10 a.m. to 1 p.m. and the afternoon meetings from 3 p.m. to 6 p.m.

Annex 1

PROPOSED ORGANIZATION OF WORK

The proposed organization of work for the fifth session of the Commission on Science and Technology for Development is as follows:

Monday, 28 May

- | | | |
|------|---------------|--|
| a.m. | <u>Item 1</u> | Adoption of the agenda and other organizational matters |
| | <u>Item 2</u> | Substantive theme: National capacity-building in biotechnology |
| | | <i>- Introduction and general discussion</i> |
| | | Panel on capacity-building in biotechnology |
| | | <i>- Introduction and general discussion</i> |
| p.m. | <u>Item 2</u> | Panel on legal and regulatory issues in biotechnology |
| | | <i>- Introduction and general discussion</i> |
| | | Panel on public awareness and participation in science
Policy-making in biotechnology |
| | | <i>- Introduction and general discussion</i> |
| | | <i>- Informal consultations</i> |

Tuesday, 29 May

- | | | |
|------|---------------|---|
| a.m. | <u>Item 2</u> | Substantive theme: National capacity-building in biotechnology |
| | | <i>- Conclusion of general discussion</i> |
| a.m. | <u>Item 3</u> | Implementation and progress made on decisions taken at the fourth session of the Commission |
| | | <i>- Introduction and general discussion</i> |
| | | <i>- Informal consultations</i> |
| p.m. | <u>Item 3</u> | Implementation and progress made on decisions taken at the fourth session of the Commission |

- *Introduction and general discussion*
- *Informal consultations*

Wednesday, 30 May

a.m. Item 4 Country reports on technology and innovation policies

- *Introduction and general discussion*
- *Informal consultations*

p.m. Item 5 Budget of the Commission

- *Introduction and general discussion*
- *Informal consultations*

Item 6 Activities of the Commission regarding the coordination of science and technology for development and other inter-sessional activities

- *Introduction and general discussion*
- *Informal consultations*

Thursday, 31 May

a.m. Item 7 Election of the Chairperson and other officers for the sixth session of the Commission

- *Introduction and general discussion*
- *Informal consultations*

p.m. Item 8 Provisional agenda and organization of work of the Sixth session of the Commission

- *Introduction and general discussion*
- *Informal consultations*

Friday, 1 June

a.m. Item 9 Informal consultations on all pending matters

p.m. Item 10 Adoption of the report of the Commission on its fifth session

- *Closing of the session*



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COMMISSION ON SCIENCE AND TECHNOLOGY
FOR DEVELOPMENT

Fifth Session

Geneva, 28 May – 1 June 2001

Item 2 of the provisional agenda

**Synthesis Report on the CSTD Panels on
National Capacity-building in Biotechnology**

Report by the Secretary-General

Executive Summary

The Commission on Science and Technology for Development (CSTD), at its fourth session in May 1999, selected as the substantive theme for its inter-sessional period 1999-2001 "National capacity-building in biotechnology", with particular attention to agriculture and the agro-industry, health and the environment. The Commission's work programme during the period 1999-2001 has been carried out through three panels. These panels covered issues of national capacity-building, including human resources development through basic science education and research & development (R&D); the transfer, commercialization and diffusion of biotechnology; public awareness and participation in science policy making; bioethics, biosafety and biodiversity; and legal and regulatory issues. The findings and policy recommendations that have emerged from these panels are contained in the present report for consideration by the Commission at its fifth session. This report provides an overview of the outcome of the work of the three CSTD panels along with findings and recommendations.



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Abbreviations and Acronyms

CBD	Convention on Biological Diversity
CSTD	United Nations Commission on Science and Technology for Development
ECOSOC	United Nations Economic and Social Council
FAO	Food and Agriculture Organization
GM	genetically-modified
GMO	Genetically-modified organism
HGP	Human Genome Project
IARCs	International Agricultural Research Centres
ICGEB	International Centre for Genetic Engineering and Biotechnology
IPP	Intellectual property protection
IPRs	Intellectual Property Rights
IT	Information technology
LMO	Living modified organism
R&D	Research and development
TRIPS	Trade-Related Intellectual Property Rights
UPOV	Union for the Protection of Plant Varieties
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNU/INTECH	United Nations University / Institute of New Technologies
WHO	World Health Organization
WTO	World Trade Organization

Overview

1. Biotechnology is a key area of technology for the new millennium. It has an immense range of applications in agriculture, healthcare, food processing, environmental protection, mining and even nanoelectronics. The use of biotechnology can ultimately provide economic and social welfare benefits to farmers, healthcare services, industrialists and consumers. Furthermore, biotechnology can contribute both to the national economy, through increased production and decreased social costs and to an improved environment. On the other hand, developments in biotechnology over the past few decades have presented significant challenges for policy makers. Much of the technology has been developed by the private sector in industrialized countries, giving rise to concerns about both the appropriateness and the accessibility of the new technologies for developing countries. Some areas of biotechnology are characterized by scientific uncertainty concerning the potentially adverse long-term impacts on health and the environment. Finally, developments in genetics and the application of gene technologies have heightened ethical and socio-economic concerns. If, therefore, biotechnology is to contribute significantly to national objectives, developing countries must build capacity to select, acquire and develop appropriate biotechnologies and manage them in such a way as to avoid or minimize potential threats to health, the environment and socio-economic well being. Developed countries should assist developing countries and countries with economies in transition to implement appropriate biotechnology applications so as to avoid potential threats.

2. The panel members recognized that the process of technology transfer is complex and involves various approaches and mechanisms. In respect of biotechnology, it is clear that appropriate approaches and mechanisms for, technology transfer are needed, which take into account some of the key characteristics of the technologies: they are science-based, knowledge-intensive, and often proprietary. It was suggested that greater understanding of the process and mechanisms of technology transfer is needed, including the role of Intellectual Property Rights regimes in facilitating or constraining successful transfer. It was recommended that studies be undertaken which would enhance such understanding.

3. Building technical capacity to absorb, develop and utilize biotechnologies within developing countries and economies in transition was the focus of the first panel. A key point, which emerged early in the current programme, was that developing country governments often spread their scarce resources for science and technology too thinly across organizations, areas of technology, and areas of application. It is evident that few countries would be able to build capacity in all areas of biotechnology, and therefore mechanisms are needed to enable the most efficient use of existing resources and future allocated resources, in respect of addressing national needs. Two mechanisms were recommended. First, a national assessment of capacity needs is recommended in order to set priorities for biotechnology development, application and governance. Second, resources should be targeted at one or more national centres of excellence which could act as loci for technology acquisition and generation, information exchange, and training. However, it was also recognized during subsequent panels that a wide range of knowledge and expertise is needed to successfully develop and manage biotechnology. This range goes beyond the scientific disciplines most closely associated with biotechnology, and includes ecology, physiology, computer sciences, together with legal, techno-managerial and policy expertise.

4. The issue of biological safety was debated at length during the second panel. It was agreed that substantial capacity-building in all areas is needed to effectively manage scientific and socio-economic uncertainties and potential risks, and that this will be a difficult task for most developing countries and countries with economies in transition. Most countries that have so far developed biosafety regimes, have done so in response to national development and diffusion of biotechnology rather than to manage imported technologies. However, it was argued that even countries with limited domestic capacity must still protect against perceived risks from imported biotechnologies and their products. For these countries, implementation of the Cartagena Protocol on Biosafety is a starting point for developing their regulatory regimes. The panels agreed that information exchange and cooperation between developing countries and economies in transition could lessen the burden on individual countries in developing regulatory regimes. Regional cooperation, especially in respect of shared ecosystems and regulatory harmonization, was recommended. It was further recommended that the CSTD could facilitate the exchange of knowledge and experiences at international level, actively seek out best practices in biosafety, and, from these activities, develop a regulatory model for dissemination. The problem of enforcing regulations, once developed, was discussed at some length. Developments in diagnostics kits might provide part of the solution in future, but nevertheless, enforcement is likely to be very costly.

5. Given the extensive demands on resources for capacity-building, it was not surprising for the panel to stress that little attention has so far been devoted to bioethics and public awareness initiatives in most developing countries. However, following the public backlash against some gene technologies in Europe, public concerns about new technologies need to be addressed, and accommodated in national policies. The panel on public awareness and public participation in science policy-making concluded that the current lack of public interest in, and knowledge about, biotechnology means that most participatory mechanisms used in Europe and elsewhere are not satisfactory and not yet viable in many developing countries. Public awareness needs to be built as a prerequisite for effective, and truly representative, participation in the policy-making process. The panel recommended that Governments, regional organizations, NGOs and the international community take a constructive role in disseminating biotechnology-related information to the public. However, it was recognized that only through incentives would the scientific community become more active providers of balanced scientific information to the public and that the mass media has to be the main conduit for such information. Training in science communication, for both scientists and journalists, and facilitating closer relationships between scientist and journalists were recommended for action for governments and international organizations.

6. Over the course of the three panels, several critical systemic barriers to successful biotechnology development and management emerged. Training across a broad range of disciplines and areas of expertise was one of these. The other key areas identified were information management, institutional structures and linkages, and national policy regimes. Each of these will require more effective networks between various "stakeholder" groups, including policy-makers, scientists, the private sector, NGOs, the international community, and the general public. Policy regimes for science and technology, and biotechnology in particular, need to be integrated both with existing national and sectoral policies, and with the needs of industry and consumers. The panels concluded that successful policy formulation is, therefore, likely to be based on consensus-building between various stakeholder groups. Institutional linkages are key factors in successful diffusion of information, knowledge and

end-products of technology. The building up of partnerships and networks, between stakeholder groups at national, regional and international levels, can therefore make a significant contribution to biotechnology development.

7. Some of the recommendations presented by the panels for consideration by the CSTD focus on activities that address the above key issues. It is recommended that governments undertake national technology assessments to identify priority needs and assess existing capacity to meet these needs. Perhaps as part of this process, governments should be able to identify one or more institutions at national level to act as biotechnology focal points, centres of information dissemination and expertise, and as loci for training, and dialogue between stakeholder groups. Identifying regional institutions to fulfil a similar role is likely to be more difficult. It was also recommended that the CSTD, in cooperation with UNCTAD should set up a mechanism, such as a committee made up of a few members to mobilize extra-budgetary resources in order to undertake further study and information searches into key policy issues such as technology transfer, Intellectual Property Rights, and biosafety. The committee would be expected to collate, synthesize and disseminate information on best practices and regulatory models for the benefit of developing countries and countries with economies in transition.

1. INTRODUCTION

8. The characteristics of modern biotechnology provide both opportunities and challenges for developing countries. The new technologies have a wide range of potential applications, and many are knowledge rather than capital intensive. If countries are able to build capacity in their national innovation system, biotechnology has the potential to support national efforts towards food security, improved healthcare, increased export potential, and environmental sustainability. On the other hand, modern biotechnology is associated with uncertain impacts on health and the environment, and has also raised some socio-economic and ethical concerns.

9. The programme of the CSTD was intended to facilitate the development of policy recommendations and initiatives which could help build capacity in developing countries, both to take advantage of the opportunities presented by modern biotechnology and to minimize or overcome possible risks associated with it. The CSTD panels identified many issues of common concern, including training, the provision of facilities, technology transfer, regulation and public awareness. The panels found that key requirements for successful capacity-building include a wide range of training needs, better access to information, appropriate and flexible institutional arrangements and linkages and coherent policy regimes. To address these needs, recommendations were made for future action by the CSTD and also for initiatives at international, regional and national levels.

1.1 Background

10. The CSTD, at its fourth session in May 1999, selected as the substantive theme for its inter-sessional period 1999-2001 "National capacity-building in biotechnology", with particular attention to agriculture and the agro-industry, health and the environment. The Commission's work programme during the period 1999-2001 has been carried out through three panels, which have addressed the sub-themes as contained in resolution 1999/61 adopted by the United Nations Economic and Social Council (ECOSOC) at its meeting in July 1999. The sub-themes cover issues of national capacity-building, including human resources development through basic science education and research & development (R&D); the transfer, commercialization and diffusion of biotechnology; public awareness and participation in science policy making; bioethics, biosafety and biodiversity; and legal and regulatory issues. The findings and policy recommendations that have emerged from these panels are contained in the present report for consideration by the Commission at its fifth session.

11. In deciding the sub-themes to be addressed by the three panels, the Bureau of the Commission emphasized that the CSTD should play a more visible role as a catalyst, particularly in raising public awareness about the risks and benefits associated with biotechnology. It was also stressed that reaping the benefits of biotechnology while at the same time lowering its risks requires that capacity is built to: generate scientific knowledge; develop appropriate governance regimes, laws and regulations; raise public awareness; and facilitate dialogue among the scientific community, policy makers, industry and the public at large. It was also underscored that many countries do not have the capacity to make choices and regulate biotechnology and lack resources to develop and diffuse biotechnology. The CSTD should help these countries identify key steps and priorities to build their own capacity

for developing biotechnology and assuring its safety, assessing impacts and ensuring that developing countries' scientists are connected to the work of their peers.

12. A key objective in seeking answers to some of the challenges facing biotechnology is to provide forums for consultations, dialogue and exchange of views and ideas between scientists and science policy makers at different levels. To this end, it was suggested that members of the Commission themselves prepare country reports or solicit papers from their national biotechnology experts and scientists that would contribute to enhancing the work of the panels. Some of these papers were subsequently presented at the various panels. The present report provides a concise description of the outcome of the following three panels:

1.1.1 Capacity-building in biotechnology

13. The purpose of this panel was to identify key steps and priorities for developing countries and countries with economies in transition to build their own indigenous capacity to:

- Monitor and assess the impact of biotechnology applications and assure their safety;
- Manage and regulate biotechnology;
- Generate knowledge for the development of biotechnology by developing human resources through interdisciplinary education, training and research.

14. This identified a number of areas of core capacities and addressed a wide range of issues, including facilitating information-sharing, identifying problems and setting priorities, monitoring and assessment, compliance with biosafety standards and managing and regulating biotechnology.

1.1.2 Legal and regulatory issues in biotechnology

15. This panel addressed intellectual property protection systems, discussed legal and regulatory issues in biotechnology and examined aspects related to biosafety and other matters relevant to the transfer and diffusion of biotechnology in agriculture, nutrition, health and the environment.

16. In this panel, biosafety regulation generated the most discussion. This was because many developing countries are now at some stage in the process of developing or starting to implement national biosafety regimes, to deal among other things, with the Cartagena Protocol on Biosafety. Many countries actually began to identify significant gaps in building capacity during this process. Gaps include lack of expertise in risk assessment of biotechnology products; technical barriers to monitoring genetically modified organisms; and the costs of enforcing biosafety regulations, particularly in the case of transgenic crops.

17. Access to information on biotechnology which is freely available on the Internet also emerged as a major issue. This was seen as a positive way to facilitate technology transfer, particularly in respect of genome sequences, including those from the Human Genome Project. These genome databases and in fact the whole area of bioinformatics, open up opportunities for developing country scientists to innovate even with few resources.

1.1.3 Public awareness and participation in science policy-making in biotechnology

18. The main objective of this panel was to create a process for building public awareness and dialogue among scientists, the biotechnology industry, policy makers and the public on the potential benefits and possible risks of biotechnology.

19. This panel addressed ways and means to create a transparent process for building public awareness and dialogue among proponents and opponents of biotechnology (e.g. scientists, the biotechnology industry, policy makers and the public) on the potential benefits and hazards of biotechnology. The panel also discussed institutional arrangements needed to address and manage concerns associated with biotechnology.

1.2 Biotechnology: Opportunities and Challenges

20. Biotechnology is emerging as an important force in the global technology market. It encompasses a wide range of techniques, many of which provide opportunities for developing countries to become significant players in this market and to address local needs of food security, improved healthcare, and environmental sustainability. On the other hand, advancements in biotechnology over the past few decades have been characterized by a great deal of scientific uncertainty. Gene technologies have also raised new socio-economic and ethical concerns. The first and second panels highlighted the potential benefits and possible risks to developing countries.

1.2.1 Opportunities

21. In agriculture and the agro-industry, biotechnology could facilitate the development of improved crops and new products and contribute toward better livestock production. Potential benefits include:

- Increased yields through new varieties with increased tolerance to stress (such as pests, diseases, herbicides, poor soil quality, climate);
- Higher nutritional content;
- Reduced post-harvest losses;
- Reduced chemical inputs, leading to both financial savings and environmental benefits;
- Reduced livestock loss through early disease diagnosis, vaccination, and improved quality of animal feed, leading to better quality (and more marketable) livestock products;
- Wider opportunities for the development of agro-industrial products, leading to increased options for farmers to diversify their economic base.

22. Applications of biotechnology, both directly and indirectly, benefit environmental sustainability in the following ways:

- By increasing yields, and reducing losses, less forest land will need to be converted for agricultural use in future;

- Pest and disease resistant crops will reduce the use of chemical inputs and change some existing farming practices which now lead to soil degradation and erosion;
- Contribute to conservation of biodiversity through the use of new cellular and molecular tools to conserve, characterize and utilize plant collections more efficiently.

23. Developments in biotechnology have provided opportunities for improved disease diagnosis and more rapid development of vaccines and therapeutic drugs. Most of these developments have taken place in industrialized countries, however, the production of these developments can be produced at lower-cost in a number of developing countries such as India and South Africa. The panels recognized the importance of the work on the human genome to the future treatment of genetic diseases and the opportunities emerging knowledge provides for developing countries. The Human Genome Project (HGP) has uncovered and will continue to uncover a tremendous amount of new information, which may provide opportunities for new therapies, new drugs and new understandings of how humans function. Genome technologies and the transfer of those technologies between countries, has tremendously boosted the detection of disease genes. Further, the development of pharmacogenomics¹ is likely to become very significant for healthcare in developing countries in the future, where the expected benefits include more effective drugs and prevention of over-treatment or ineffective use of drugs.

24. Further, developments in genomics have provided vast amounts of public knowledge, much of it freely available on the Internet, which could be utilized by developing country scientists.

1.2.2 Risks and Uncertainties

25. Whilst recognizing that biotechnology is likely to play an increasingly important role in economic development and human welfare, the panels also accepted that biotechnology is characterized by scientific uncertainty and has presented new socio-economic, political and ethical threats. The meetings highlighted the main concerns for developing countries in respect of human health, environmental sustainability and socio-economic welfare.

26. Key risks that are directly associated with the application of gene technologies concern the impact of genetically modified crops on the environment and the potential impacts on human health from genetically modified food products. In respect of health, the risks were identified as:

- Introduction into food products of previously unknown allergens, or toxicity in novel food products and processes;
- Potentially adverse impacts of residual antibiotic marker genes in food. Even more uncertainty surrounds the environmental safety of genetically modified crops, particularly in respect of:
- Potential adverse impacts on non-target organisms;

¹ Pharmacogenomics is a relatively new and rapidly progressing area, which combines pharmacology (concerned with drug dosages) and genomics, which is providing critical new knowledge about individuals' metabolism of specific drugs.

- Development of resistant pests, diseases and weeds;
- Loss of genetic crop diversity, leading to future possible increases in crop vulnerability to pests and diseases.

27. Some of the major potential socio-economic problems identified, particularly concerning the introduction of new GM crop varieties, were:

- New technologies which are not appropriate to developing country needs;
- Loss of markets that ban or avoid transgenic crops;
- Reduced competition in input supply resulting in fewer choices or higher prices for farmers;
- Inequity of distribution of benefits, where farmers who cannot afford the new genetically-modified crop varieties are further marginalized;
- Ownership issues related to intellectual property rights, especially where "broad patents" effectively close down areas of opportunity for developing country research;
- Public fears about the introduction of new technology and its applications.

28. These risks are not inherent in the technologies, but rather are associated with the way the technologies are taken up and applied. This, therefore, needs careful consideration and management.

1.2.3 Policy Challenges

29. For developing countries and countries with economies in transition, the fundamental challenge is to find ways and means to harness the potential benefits of the biotechnology knowledge base in support of national needs, whilst at the same time managing and minimizing the potential risks and uncertainties associated with the application of this knowledge. Common issues of concern to most countries were discussed. These included improving food security, increasing crop productivity, conserving biodiversity, reducing pest management costs, building institutional capacity for risk assessment, accessing information and developing human resources.

30. The panel members identified a number of major obstacles to biotechnology development that are common in most developing countries. These were inadequate financial resources, shortage of skilled manpower, poor infrastructure, difficulty in obtaining necessary equipment, and lack of clear strategies to advance the use of modern biotechnology. Barriers to the successful management of biotechnology include the lack of public awareness over potential benefits and possible risks of biotechnology applications and the lack of capacity to monitor and assess as well as manage and regulate biotechnology. Also, intellectual property management was considered to pose a difficult challenge for many countries as a number of them do not have regulatory systems in place.

31. In summary, it was agreed that policy makers need to take a holistic approach to capacity-building for biotechnology. Capacity is needed to access and monitor information on new techniques and applications, to acquire, absorb, adapt, develop and manage appropriate biotechnologies. This will require a wide range of scientific, techno-managerial and legal expertise. New institutional arrangements may be needed, with linkages and partnerships

being particularly important. Most biotechnology capacity in developing countries is located in universities and public research institutes; the private sector in developing countries needs to be encouraged to actively engage with the new technologies. Furthermore, there is a need to monitor new developments and inform the public.

2. NATIONAL CAPACITY-BUILDING

32. From country reports, it was clear that few countries have as yet developed comprehensive policy regimes targeted at biotechnology development. Others, such as Colombia, have already established national biosafety/biotechnology commissions to oversee biotechnology development and applications. It was recognized that developing countries and countries with economies in transition present an extremely diverse set of socio-economic and political contexts and represented widely-varying stages of technological development. However, the panels addressed issues that are likely to be of common concern to most countries. These were categorized as:

- Technical capacity needs: how to identify priority needs for resource allocation and build up centres of expertise in biotechnology;
- Regulatory mechanisms, particularly intellectual property rights and biosafety regimes, but also, mechanisms which facilitate the acquisition of new technologies;
- Public awareness, perceptions and participation in decision-making.

33. The following sections outline the highlights of the panels' discussions and conclusions.

2.1 National Assessments of Capacity Needs

34. A long-term integrated policy approach is needed to build capacity for biotechnology. This means reviewing and harmonizing policies in education, science and technology, health, agriculture and other key sectors. Furthermore, policy and legal capacity needs to be developed to address problems of technology transfer, intellectual property rights and regulatory regimes relating to biotechnology. Building comprehensive capabilities across all these areas is impossible for most developing countries.

35. Many developing countries, particularly those of Africa, tend to spread their limited financial and human resources across biotechnology sectors and research agencies. While many have recognized the importance of setting biotechnology priorities and concentrating resources in selected programmes, areas of application and/or institutions, many more continue to operate research programmes in an ad hoc way, within isolated, competing and often scientifically weak research organizations.

36. When considering developing countries that have made significant advances in developing scientific capacity to engage in biotechnology development, such as Argentina, Brazil, Colombia, India, the Islamic Republic of Iran, the Republic of Korea, Mexico and South Africa, the following observations were made:

- Most of the very substantial investments in capacity-building, including resources for coordination, management and oversight of capacity-building programmes, have come from national government budgets;
- As a result, even the larger countries have selectively targeted areas of biotechnology and their application, for capacity-building.

37. There is a perceived need in most developing countries to utilize existing capacity more effectively and establish priority needs in respect of future resource allocation. In carrying out a "capacity needs assessment", even countries with a low capacity in biotechnology could bring together the relevant stakeholders – including policy makers, regulators, the scientific community and the private sector – to plan for efficient use of scarce resources that is commensurate with national needs and to identify key institutions which might become focal points or centres of excellence. It was reported that these types of assessments are currently being carried out in several countries in sub-Saharan Africa.²

2.2 Centres of Excellence

38. There are a growing number of national centres of excellence in developing countries that are utilizing and developing advanced biotechnologies, particularly in Latin America and Asia. Some of these centres are dedicated to biotechnology, but more often the centre is more specifically mandated to carry out R&D in a particular sector (usually agriculture) or a specific area of agricultural application. Some institutions have been founded as centres of excellence, others have been built up by targeting established institutions in which to concentrate existing and additional resources for biotechnology. The financial resources needed to build capacity in these centres has mainly come from national Governments and other national public agencies. Occasionally, a national centre has been nominated as a regional centre of excellence³ and this has opened up opportunities for international funding.

39. However, there are still few regional centres of excellence for biotechnology in the South. Regional centres could act as loci for information dissemination and regional dialogue and cooperation in biotechnology development and management. Nevertheless, one single institution could not contain all the various types of knowledge, expertise and technologies which might be desirable within a whole region. Therefore, it is likely that several centres of excellence would be needed at the regional level. Identifying and establishing sustainable funding mechanisms for suitable institutions and locations might be problematic.

40. Nevertheless, the CSTD panel agreed that work should commence to identify existing and potential centres of excellence, both at regional and national levels, which could take on roles as focal points for regional networks and perhaps undertake some training activities. They could, at least, act as a 'first port of call' for scientific and regulatory advice. Some of the international agricultural research centres (IARCs), together with regional and national centres of excellence in both industrialized countries and countries with economies in transition, could support capacity building efforts in less developed regions.

² One project involves assessments in several east and southern African countries, undertaken by the African Centre for Technology Studies, Nairobi. Another is being undertaken in Ghana under the auspices of the Ministry of Environment, Science & Technology, which is funded by the Department for International Development (DFID), UK.

³ This is the case for the Agricultural Biotechnology Centre in Hungary.

2.3 Technology Transfer and Diffusion

41. Two aspects of technology transfer are important. The first is the international transfer of technology, usually from industrialized to developing countries. The second is the diffusion of technology, both imported and locally developed, from the importing or innovating organization into the wider economy. The effectiveness of the various mechanisms of and incentives for, technology transfer are still not sufficiently clear, despite many years of study on this issue. In fact, country reports to the CSTD panels highlighted the problem of a lack of systematic understanding of the process of technology transfer and diffusion at the national level. Many countries reported that biotechnology is being developed primarily in the public sector research system. Transfers through private enterprises were few and generally involved more mature technologies such as tissue culture and fermentation techniques.

42. It was pointed out that the traditional "pipeline model" of technology transfer and policies associated with it, had often resulted in a great deal of technological failure in respect of contributing to development objectives. This model assumes that new technologies developed in the north are eventually transferred to developing countries mostly through foreign direct investment, where the technologies are then automatically absorbed and diffused in the receiving country. However, it has become evident that building capacity to absorb, diffuse and maintain new technologies is far more complex and costly than this linear model suggests.

43. Adherence to the model has tended to highlight problems of financing the initial acquisition of proprietary technology. On the other hand, taking a new approach to technological capacity-building reveals both enormous opportunities, and some alternative policy issues to be addressed. For example, a great deal of biotechnology-related knowledge is already in the public domain and therefore freely available to anyone who can access it. Accessing this knowledge is a key problem to be addressed. It is worthy to mention that the CSTD has in 1993 recommended the facilitation of such access to information through the Internet. Country reports to the CSTD indicated that such knowledge transfer is often effected through north-south collaborative research partnerships involving universities and public sector research institutes. Universities can therefore play a key role in the take-up, utilization and diffusion of new, publicly-available knowledge. However, there is a need to focus on what is really needed within the country. Collaborative research is often geared towards overseas donor agendas. Furthermore, a focus on overseas collaboration and competition for donor funding can undermine cooperation and networking between national research organizations and also between institutions from different countries in the south.

44. On a more positive note, some new approaches were suggested to overcome barriers to technology transfer. These included:

- Devising economic incentives to encourage local private sector participation in biotechnology development and seeking out opportunities for partnerships between the public sector and private sector (both at home and overseas);
- Finding ways to utilize the knowledge and skills of nationals based in other countries, perhaps through establishing networks and partnerships, in order to gain rather than lose from the perceived "brain drain";

- Focusing on mechanisms through which to access publicly-available biotechnology;
- Giving serious consideration to bioprospecting as a mechanism of technology transfer: this, it was pointed out, has not been fully explored, despite the original key objectives of the Convention on Biological Diversity (CBD).

45. The systemic nature of technological development must be recognized in order for initiatives to succeed. For example, providing access to Internet based information is relatively easy, but this will have little impact where the host institution is unable to pay the high on-going costs of Internet usage. To this end, it was stressed that as far back 1993, the CSTD has called for affordable access to the Internet. However, biotechnology does present developing countries with opportunities for technological leap-frogging, if the underlying barriers to successful technology transfer, including financial and legal measures and absorptive capacity, are addressed.

2.4 Intellectual Property Rights

46. Some panel members felt that, as has been traditionally reasoned, that a strong intellectual property rights (IPRs) regime will encourage the inward transfer of technology, though in fact there is a shortage of empirical evidence to support this. It was argued that many statistics and case studies show that the role of IPRs regimes has been exaggerated with respect to technology transfer. It was noted that IPRs have often been seen as the major obstacle to technology transfer and this is particularly the case with more advanced technologies such as biotechnology. It was also pointed out that there are two arguments against this view, which are supported by evidence from those developing countries that have successfully entered into new areas of technology:

- Where national capacity exists to make use of proprietary knowledge, the capacity to negotiate and pay royalty fees also generally exists;
- With knowledge-intensive technologies like biotechnology, there is a huge amount of knowledge already in the public domain.

47. However, IPRs regimes are important in two respects. First, depending on the proprietary technology and its intended application in the receiving country, some firms are unwilling to transfer technologies to countries that cannot strictly enforce their proprietary rights through IPRs regimes, particularly patents. Second, when patents expire, the technology comprehensively described in the patent, passes into the public domain, which makes a national patent office a good source of scientific and technical knowledge.

48. Panel members pointed out that since the foundation of the World Trade Organization (WTO) and its associated international agreements, much of the policy debate about the role of IPRs systems in technology transfer has been superseded by the imperative to conform to WTO provisions on IPRs. For countries that are member States of the WTO, there is an obligation to implement the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS). Specific issues which relate to biotechnology include:

- The patenting of micro-organisms, and other living matter, especially human genes;

- IPRs for plants, either through membership of UPOV (Union for the Protection of Plant Varieties), or through a *sui generis* system⁴.

49. Many developing countries have yet to decide their position on, or are firmly opposed to, IPRs for living matter. As the TRIPS Agreement stands, patents must be allowed for micro-organisms and in some industrialized countries the definition of micro-organism extends to sub-cellular material such as genes, gene sequences and plasmids.

50. Another area of contention is the adoption of the 1991 UPOV Convention to conform to the TRIPS requirement of IPRs for plants. It was noted that whilst many developing countries found the 1978 Convention acceptable, the revised Convention is not generally favoured. *Sui generis* systems of IPRs for plants have been developed in some countries, including India, South Africa and Nicaragua. However, these may be unacceptable to the WTO or some of its members states. The Convention on Biological Diversity has called for the WTO to recognize the importance of *sui generis* systems, though it has not been possible to come up with concrete guidelines at a global level for such systems.

51. Some panel members expressed concern that development of IPRs regimes in developing countries in order to conform to TRIPS may not provide sufficient benefits to those countries to justify the heavy resources expended. On a global scale, it was noted that only a small proportion of patents held world wide (4 per cent) are owned by developing country innovators, including those from newly industrialising countries. The associated costs of implementing TRIPS has made implementation very difficult, prompting most developing countries to request an extension beyond the January 2000 deadline. Several country reports to the CSTD Panel on Legal and Regulatory Issues in Biotechnology indicate that patent offices in many developing countries are under-staffed and poorly equipped to implement TRIPS, particularly in respect of advanced technologies such as biotechnology. Thorough patent searches are often impossible. Enforcement of IPRs is likely to be extremely difficult under these circumstances.

52. The issue of protecting traditional knowledge was discussed extensively. It was recognized that there are some inherent problems in respect of existing IPR regimes. Two characteristics of traditional knowledge are fundamentally incompatible with existing forms of IPRs. First, it is "traditional" – handed down across generations, rather than being newly generated and therefore, does not meet the innovative criteria of conventional IPRs regimes. Second, the knowledge is often held by, or on behalf of, communities, where conventional forms of IPRs confer legal rights on individuals. This perspective tends to favour the view that new forms of intellectual property protection (IPP) are needed to adequately protect traditional knowledge. An alternative view suggests that, before trying to develop an entirely new form of regulations, existing IPRs regimes should be exhaustively tested to see whether they may be suitable to protect traditional knowledge and/or genetic resources, at least in some aspects. It was noted that, currently, most arrangements which involve access to genetic resources and traditional knowledge are effected through simple contracts. This raises the question as to whether *sui generis* contracts already provide an adequately effective system.

⁴ *Sui generis* means "one of a kind". In this context, it therefore refers to a legislative or regulatory regime for protecting plants as intellectual property that is developed at national level, and that may be unique to that country. When reference is made to a *Sui generis* regime in the TRIPS Agreement (article 27.3.b), the expression is used in relation to the protection of plant varieties only.

53. Few panel members were able to report significant developments in their own countries in respect of intellectual property protection for traditional knowledge. In fact, many countries have first to undertake a substantial amount of research in order to fully assess their genetic resources and traditional knowledge associated with them. It was recognized that many organizations, including international agencies, are interested in the area of IPP for traditional knowledge, though the extent of their activities and progress was not clear. It was pointed out that the CBD had been actively working on the subject for several years, but was unable to report significant progress. Some panel members noted that, whilst there seem to be many international forums for debate, little practical development is actually taking place.

2.5 Biosafety and Bioethics

54. Country reports indicated that biosafety regimes have been, or are in the process of being, set up in many member countries, although evidence was presented to suggest that the majority of smaller developing countries had not yet formulated policies or regimes for biosafety.⁵ Of those countries having introduced specific measures to manage biosafety, there are wide-ranging differences between them in terms of the scope of regulation, the approach taken (that is, the development of an entirely new regime, or building on existing regulations), the institutional arrangements and mandates for implementation and the types of regulatory mechanism used. Biosafety Committees or Commissions have been established in many countries to oversee implementation of national policies, although, with one or two exceptions, these Committees act in an advisory capacity only. Some countries having drafted biosafety regulations have not yet established institutional mechanisms for implementation.

55. Some key problems for enforcement of biosafety regulations and laws were highlighted. Several countries in Latin America have reported wide-scale illegal planting of transgenic crops. Diagnostic kits to identify such crops are in use in at least one of these countries. However, it was recognized that the costs of enforcement are likely to be high and regulatory agencies do not have sufficient capacity to handle some of the new technologies and their products. The concerns here include a lack of trained personnel and institutions and poor legal infrastructure, to assess and manage risks. It was noted that a wide range of scientific expertise is needed in order to develop enforceable regulations and procedures, including enhanced capacity in molecular biology, ecology and physiology. A major concern identified in developing risk assessment procedures is that they need to be ecosystem-specific. Lack of detailed knowledge about specific ecosystems will make effective risk assessment very difficult.

56. A question was raised concerning the appropriate timing for developing countries to formulate and implement national biosafety regulations, depending on their level of technological development. On the one hand, it was suggested that capacity-building in the use of biotechnology should precede the introduction of biosafety regimes, on the basis that there is little point expending resources to regulate technology which is not used in the country. This 'reactive' approach has been dominant in countries which are now advanced in biotechnology. The opposing argument is that biotechnology is developing very rapidly, whereas the development of biosafety regimes has been slow – this would favour a proactive

⁵ For example, whilst some countries of the Latin American and Caribbean region have long-established regimes, it was reported that over 60 per cent of the region's countries have not yet built regimes.

approach to developing such regimes. Some members of the panel felt strongly that, where capacity to develop and manage biotechnology does not exist in some developing countries, there is still a need for biosafety regimes to manage potential risks from imports, legal or otherwise. It was noted that the spreading of genetically modified organisms (GMOs) also occurs through natural processes. Therefore, there is a need for a protection measures even in the absence of imports of GMOs.

57. From country reports presented, it was clear that in countries where regulations have already been developed, this has generally been done in response to domestic developments in biotechnology, rather than in response to international concerns or in anticipation of future needs. For countries that have yet to introduce national competent authorities, and/or regulations and guidelines, implementation of the Cartagena Protocol, the international agreement negotiated under the Convention on Biological Diversity to regulate international trade in Living Modified Organisms (LMOs), seems to be the starting point. Countries which are, or are preparing to become parties to the Cartagena Protocol on biosafety must be prepared to introduce institutional structures and procedures which are commensurate with terms and conditions of that agreement.

58. The development of risk assessment procedures under the Protocol is still being debated at the international level by signatory countries. Capacity to undertake such assessments is a major concern for many developing countries, although the terms of the Protocol state that the receiving country does not have to carry out the risk assessments themselves, but rather can require the exporter to undertake and pay for an independent assessment. However, it was pointed out that national regulations may need to go beyond implementation of the Cartagena Protocol. The Protocol is limited, in that it only covers transboundary movements of LMOs, not their release within national borders, and it only applies to some classes of LMOs.

59. The panel on Legal and Regulatory Issues in Biotechnology recognized that the Protocol raises concerns about apparent contradictions and inconsistencies which exist in international agreements. A key example of this problem is likely to be the application of the Cartagena Protocol's Precautionary Principle to risk assessments. This principle holds that an absence or lack of scientific certainty about the potential risks of a technology cannot be used to justify claims that it is safe. In this case, the onus is on the technology exporting country to prove that the technology does not pose a life or health threat to human, animal or plant. On the other hand, WTO agreements that allow trade restrictions on the basis of protecting health and the environment put the onus on the importing country to justify such restrictions. It was pointed out that there are concerns that this inconsistency could lead to difficulties between technology exporting countries and importing countries.

60. Given some of the very complex and potentially costly requirements of formulating and implementing national biosafety regimes, the discussion turned to the role of the international community in assisting developing countries. It was cautioned that for too long, global discussions have focused more on trade in genetically modified commodities and less on trying to share experiences and expertise on national regulations and guidelines. One way in which it was suggested the costs of biosafety implementation could be kept down is through regional cooperation. It was pointed out that the Andean countries have developed a common pact on transboundary movement of GMOs, where different countries share some of

the same ecosystems. Regional pacts are also useful for the harmonization of biosafety standards between countries. To this end, it was emphasized that dissemination of best practices in regulations and guidelines, whether national or regional, would be very helpful to those countries seeking to establish legal and regulatory regimes. It is important to note that the United Nations Industrial Development Organization (UNIDO) is responsible for BINAS (the Biosafety Information Network and Advisory Services), which provides a comprehensive database of biosafety regulation, and information on field releases of GMOs in developing countries and countries with economies in transition. Such information can be found on-line at the BINAS web site (<http://binas.unido.org/binas/>).

61. Bearing in mind the lack of resources available, and the complexities of fulfilling both international obligations and meeting national needs, it was concluded that a two-pronged approach to biosafety may be appropriate: one short-term and the other long-term. The international community could organize training to facilitate both implementation of international regulations and build long-term capacity. At the same time, coordination and dissemination of national models for implementation would give more immediate assistance to those countries that have the least existing capacity to formulate biosafety regimes.

62. Going beyond issues of physical risk, it was clearly recognized that advances in biotechnology have raised, or increased, some moral and ethical concerns about the potential misuse of new technology. Many of the major fears about the potential of new genetic knowledge and the application of genetic engineering concern human health. However, bioethics is now also concerned with environmental ethics and with potentially adverse social and economic impacts of advanced biotechnologies, particularly regarding the introduction of genetically modified crops.

63. It was noted that the United Nations Educational, Scientific and Cultural Organization's International Council on Bioethics has urged all Governments to develop procedures for bioethics management.⁶ None of the members of the Panel on Legal and Regulatory Issues in Biotechnology reported specific initiatives related to bioethics in their countries, though in some countries public awareness and public interest had been taken into account in the development of biosafety regimes more generally. In practice, the stakeholder community (that is, all those potentially affected by decisions made to promote or restrict a particular technology application) will reflect not only a wide variety of political, religious and cultural views, but also different levels of knowledge about the complex technologies concerned. This makes the issue of public awareness critically important.

2.6 Public Awareness and Participation in Science Policy-Making

64. At the first two CSTD panels on biotechnology, the need for greater public awareness and participation in decision-making regarding technology emerged as a significant issue for developing countries. The public concern against genetically modified products in some western European countries, strongly reinforced the need for a more transparent process of informing and involving non-experts in biotechnological development. One panel member pointed out, that although no commercial releases of GMOs have yet taken place in a number of developing countries, overseas anti-biotechnology groups are lobbying to oppose the

⁶ UNESCO 1997, Article 16

development of gene technologies. As a result, it was felt that there is an urgent need to sensitize and objectively inform the public to some of the issues being raised in this way.

65. Increasing public acceptance of gene technology is a major incentive for national authorities and the scientific community. Therefore, it is essential investment be made in raising public awareness and involving the public in science policy-making. However, it was noted that in Europe for example, it seems that where the level of public awareness is relatively high, public acceptance of gene technology is not necessarily higher and is often lower than in countries with lower levels of awareness. This suggests that public awareness alone will not generate public acceptance of gene technology. Rather, the problem is one of awareness based on balanced, science-based information reaching the general public.

66. Even in industrialized countries, scientific literacy of the general public is considered to be very low, despite universal access to higher education, the mass media and other sources of information. For developing countries, with wide disparities in levels of education and access to information, the task of building greater scientific awareness will not be an easy one. To a large extent, this will depend on the ability and willingness of many different groups of people to improve information flows and engage in meaningful dialogue. Three key aspects of this communication process were identified as:

- The obligation of science to inform;
- The duty of the public to become informed;
- The appropriate role of journalists relative to science and the public.

67. Some government ministries have now initiated activities to provide such information, to balance the often adverse and scientifically inaccurate coverage of biotechnology in the mass media. Again, supply of balanced information has been found to be insufficient in raising awareness, particularly if it is not actively disseminated through channels routinely accessed by the public. Furthermore, it was noted that in some countries, the public does not always fully trust Government to provide unbiased scientific information.

68. Mass media participation is critical in raising public awareness. It was felt that journalists need to be responsible in their reporting of science news, but at the same time, it was recognized that the mass media's first priority is to provide "good stories" to the public, to increase circulation and attract advertisers. However, the quality of the scientific content of news stories could be improved if journalists receive training in science communication. It was recognized that there are not enough specialized science journalists in developing countries and science stories are rarely given prominence in the news. Also, there is evidence that science stories are often badly written, in terms of ease of reading. Better liaison with scientists is needed, but it may be up to the scientists themselves to initiate the building of such relationships.

69. Although there is a perceived need for scientists to become more directly active in raising public awareness with regard to their work, they are precluded from doing so for a number of reasons. First, the professional requirements of research, dissemination of research results and teaching of which scientists' careers depend, take up much of their time. Second, free discussion of their findings, particularly through the mass media, may be subject to institutional or funding agency restrictions, where intellectual property rights or other issues

force and demand secrecy. Third, scientists may not necessarily have the training or ability to communicate their work in "lay" terms to the general public. Therefore, mechanisms and incentives which enable and encourage scientists to widely communicate their results are needed.

70. In many developing countries where public awareness of science is low, public interest in science is also often low, limiting the potential success of activities to raise public awareness and to involve the public in science policy decision-making. As many countries do not have a universal education system and are burdened by language divisions, channels of mass communication often reach only a minority of the population, there are significant problems in respect of genuine public representation in national science policy. Nevertheless, various participatory mechanisms can still be useful for targeted stakeholder groups, or for local consultations. Further, the allocation of resources for mechanisms to involve the public in policy decisions is constrained by extremely limited public funds. Given this and where there is also a perceived lack of public awareness and interest in science policy, it was agreed that public participation must be justified in terms of expected benefits against expenditures.

71. On the other hand, it was noted that public fears about new technology are easily and rapidly stimulated, as is evident in some countries in Europe, where anti-biotechnology interest groups have very successfully engaged the participation of the media in their campaigns. Therefore, countries where public awareness and concern are low at present cannot afford to be complacent. Although a difficult task is faced in encouraging public interest, a concerted effort must nevertheless be made.

3. KEY ISSUES

72. Several key systemic issues related to capacity-building emerged from the panel discussions, which are briefly outlined in this section. They include interdisciplinary education and training and the importance of centres of excellence in these processes; IPRs and the transfer of technology; biosafety and regulations, monitoring and assessment of biotechnology; public awareness; information management, institutional structures and networks and integrated policy regimes.

3.1 Training

73. A wide range of expertise needs to be implemented, in order to support successful development and management of biotechnology. Initially, it is necessary to train scientists in disciplines most closely related to "modern" biotechnology, such as molecular biology and biochemistry. Other scientific disciplines, such as ecology and plant physiology, together with computer sciences, including electronic information management are also critical, particularly in respect of biosafety. Furthermore, greater policy, legal and techno-managerial expertise must be incorporated in areas critical to biotechnology development such as intellectual property rights and technology transfer. Finally, education in other diverse areas ranging from philosophy to science journalism is needed in order to address ethical issues and appease public concerns surrounding the application of gene technologies.

74. Developing countries need to identify possible gaps in existing education programmes and where appropriate obtain or provide training such as through centres of excellence, at

national or regional levels. Some international organizations already provide courses directed at managing biotechnology. Notable amongst these is the International Centre for Genetic Engineering and Biotechnology (ICGEB), although this institution usually provides financial support for training representatives from its own member countries. The ICGEB, therefore, financially precludes some countries which are in the greatest need of training. It was agreed that international support for such countries is needed.

3.2 Information Management

75. It was recognized that better access to information and knowledge would greatly facilitate acquisition, development and diffusion of biotechnology, as well as the development of legal and regulatory frameworks to manage technologies. Objective information about biotechnology should be provided by academics, Governments and the mass media and disseminated to the general public in comprehensible terms.

76. In respect of building technical and scientific capacity, the following needs were highlighted for future attention:

- Providing greater access to electronic databases and other Internet-based information sources;
- Implementing mechanisms to select (from the huge volumes of available information on biotechnology) and disseminate information which is most relevant to capacity-building and policy formulation;
- Disseminating information in different languages;
- Building networks for sharing information and expertise.

77. The panels concluded that a crucial area for national capacity-building in respect of information flows was to facilitate access to new knowledge through promoting and establishing an information technology (IT) infrastructure. Access to the Internet is an increasingly important resource for technological development and programmes should be established—with international support where necessary—to improve such access. In particular, resources should be targeted at addressing some of the contextual problems of Internet access in developing countries. These include the high cost and low reliability, of telecommunications systems; the scarcity of web server facilities; problems of power supply and equipment failure; and, the unequal distribution of Internet access, where few facilities exist outside capital cities.

3.3 Institutional Structures and Linkages

78. Networks and collaborative research links were recognized as important mechanisms for information and knowledge transfer. It was recommended that national Governments enact policies to promote the establishment of such links. Furthermore, careful attention should be paid to ensuring that the most effective utilization is made of these links in respect of knowledge and information transfer. Therefore, policies should:

- Promote user-innovator networks, including links between industrialized and developing countries and links between the public and private sectors;

- Encourage collaborative research agreements which provide for equitable sharing of benefits, recognizing that such benefits should go beyond financial reward to include technology transfer;
- Ensure the allocation of resources to provide new knowledge and equally important to extend support to mechanisms to diffuse this knowledge through appropriate instruments, including global satellite networks.

79. At the level of individual institutions, it was noted that research institutes in particular might need to become more flexible to move into and invest in quite diverse areas of expertise. Advancements in biotechnology have brought about rapid technological changes in all sectors, particularly in agricultural research. New products very quickly displace existing products and processes. A classic example of this can occur when genetic engineering threatens to displace conventional plant breeding, which has its own set of techniques and skills built up over a long period. Such technological 'discontinuities' can lead to tension between the need to introduce new technology and the reluctance to abandon existing capacity in older technologies.

80. Finally, there is a need to enhance and develop "science diplomacy". There is an emerging belief that some of the resources expended on traditional diplomatic activities might be effectively used to forge partnerships with prominent institutions of higher learning and research.

3.4 Integrated Policy Regimes

81. Policy regimes for biotechnology need to be harmonized with and integrated into other sectoral policies. Moreover, they should also take into account the need to encourage private sector investment in technological development, as well as the concerns of the general public. This requires building relationships between Governments and many other stakeholder organizations and groups, including universities, research institutes, private firms, farmers and healthcare providers. In particular, policy-makers should encourage complementary roles for the public and private sector within the national R&D system. Policies should be a product of dialogue between these stakeholders and should rely on a continuous input of scientific expertise in order to reflect the rapidly-changing technical complexities associated with biotechnology development.

82. Furthermore, it should be recognized that building capacity for biotechnology development and management requires long-term commitment and planning. It was suggested that a key weakness in many developing countries is not so much the lack of expertise, but the inability to establish programmes for capacity-building and to sustain them over a long period.

4. CONCLUSIONS

83. Over the course of the three panels, several critical systemic barriers to successful biotechnology development and management emerged. Training across a broad range of disciplines and areas of expertise was a primary barrier. Other key barriers identified were information management, institutional structures and linkages and national policy regimes. In order to overcome these barriers, a more effective network between various 'stakeholder'

groups, including policy-makers, scientists, the private sector, NGOs, the international community and the general public is required. Therefore, there is a need for policy coherence. Specifically, policy regimes for science and technology and biotechnology need to be integrated both within existing national and sectoral policies, as well as within the needs of industry and consumers. The panels concluded that successful policy formulation is, therefore, likely to be based on consensus-building between various stakeholder groups. Institutional linkages will be key factors in the successful diffusion of information, knowledge and end-products of technology. The building-up of partnerships and networks, between stakeholder groups at national, regional and international levels, can therefore make a significant contribution to biotechnology development.

84. Recommendations put forward by the panels for consideration by the CSTD focus on activities which address the above key issues. It was recommended that Governments, in collaboration with the CSTD and UNCTAD, undertake national technology assessments to identify priority needs and assess existing capacity to meet these needs. Perhaps, as part of this process, Governments should identify one or more institutions at the national level to act as biotechnology focal points, centres of information dissemination and expertise and as loci for training and to promote dialogue between stakeholder groups. Identifying regional institutions to fulfil a similar role is likely to prove more difficult.

5. KEY RECOMMENDATIONS FOR THE CONSIDERATION OF THE CSTD

85. The three panels raised a number of issues that resulted in findings and recommendations to Governments and the international community in terms of policy options and needed initiatives and strategies for national capacity-building in biotechnology. The following are some of the recommendations:

5.1 National Technology Assessments

86. The CSTD, in collaboration with UNCTAD and other relevant United Nations agencies, should develop a methodology to undertake technology assessments or, "capacity needs assessments". This, in order to assist Governments of developing countries and countries with economies in transition build national strategies, coherent policy regimes and action plans, which address:

- Identifying priorities for capacity-building in the areas of food production, healthcare and the environment, including the conservation of biological resources;
- Formulating frameworks for the identifying, evaluating, acquiring, adapting, developing and managing of biotechnology;
- Discerning information needs, particularly with respect to monitoring global developments in biotechnology;
- Generating knowledge via focal points, centers of excellence, IT networks, etc.

5.2 National Focal Points

87. National governments are invited to identify and communicate contact details of a national institution in order for the Commission to establish a network to coordinate activities relating to:

- Participation in and contribution to the UNCTAD network on Science and Technology for Development;
- Information collection and dissemination in respect of biotechnology developments, including policy and regulatory issues;
- Public awareness and public participation in science policy-making;
- Identification of centres of excellence in biotechnology.

88. These national bodies should be able to take responsibility for liaising with relevant organizations at the local level. At the international level, the CSTD should disseminate information via this newly established network of national coordinating bodies.

5.3 Models and Best Practices

89. Panel participants agreed that the CSTD is well-placed to serve as a catalyst in raising public awareness and improving public understanding of biotechnology-related issues such as food production and food safety. In this connection, the CSTD may wish to collaborate with relevant institutions to draw up guidelines for raising public awareness. These guidelines should be published in a succinct easy-to-read handbook, or possibly a "resource pack".⁷ This resource pack could include balanced information on biotechnology and examples of mechanisms and appropriate institutional arrangements to educate the public and inform the media and policy-makers about biotechnology.

5.4 Technology series studies

90. UNCTAD should undertake studies which seek to provide, through empirical case studies, a better understanding of:

- The potential impact of TRIPS regimes on the transfer of technology including impact on technological development and diffusion of biotechnology;
- The role of information networks in technology transfer.

91. The CSTD may wish to consider whether a mechanism, such as the creation of a group made up of Commission members to ensure the implementation of its recommendations, including mobilization of extra-budgetary funds for their funding. The group would be expected to collate, synthesize, and disseminate information on best practices and regulatory models for the benefit of developing countries and countries with economies in transition. UNCTAD would serve such a group.

92. The key recommendations presented here, to the fifth Session of the CSTD, were formulated on the clear understanding that such recommendations could realistically be

⁷ A small sample "resource pack" was distributed at the 3rd panel, for consideration.

implemented only if additional extra-budgetary resources are made available to the secretariat. It is recognized that mechanisms are needed to ensure follow-up actions are taken on approved recommendations wherever possible and that barriers to implementation are clearly identified and reported to subsequent sessions.

References

In addition to contributions from panel members, the following papers have been drawn upon for this report

Dr. John Mugabe (April 2000), African Centre for Technology Studies (ACTS), Kenya. "Biotechnology in developing countries and countries with economies in transition: strategic capacity building consideration"

Prof. Lynn Mytelka (April 2000), Carleton University, Canada. "Building capacity for biotechnology monitoring and assessment"

Dr. Peter Gregory (April 2000), Jellinek, Schwartz & Connolly Inc., USA. "Managing and regulating biotechnology in developing countries: key steps to building national capacity"

Prof. Calestous Juma (July 2000), Centre for International Development, Harvard University, USA. "Promoting biotechnology acquisition and development – the broad policy context"

Prof. Gert-Jan van Ommen (July 2000), University of Leiden, Netherlands. "The Human Genome Project: issues arising for technology transfer, Intellectual Property Rights, and bioethics"

Dr. Rodrigo Artunduaga Salas (July 2000), Colombian Agricultural Institute, Colombia. "Biosafety regulations related with transgenic plants in Latin America and the Caribbean region"

Prof. Richard Braun (November 2000), European Federation of Biotechnology Task Group on Public Perceptions of Biotechnology. "The Europeans' ambivalence about biotechnology: Possible ways forward"

Prof. Vladimír Bálež (November 2000), Dean, Faculty of Chemical Technology, Slovak University of Technology, Bratislava. "Biotechnology in science and in policy"

Mr. G. Essegbey (November 2000), Senior Scientific Officer, Science & Technology Policy Research Institute, Ghana. "Technology Assessment, stakeholder participation and public awareness: Experiences in a Developing Country Context"



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Item 3 of the provisional agenda

**COMPREHENSIVE NOTE ON THE IMPLEMENTATION OF AND
PROGRESS MADE ON DECISIONS TAKEN AT THE
FOURTH SESSION**

Note by the secretariat

Executive summary

The present note has been prepared by the UNCTAD secretariat in accordance with Economic and Social Council decision 1999/274 on the report of the Commission on Science and Technology for Development on its fourth session and the provisional agenda and documentation for the fifth session of the Commission. In particular, it addresses work carried out during the inter-sessional period 1999–2001 in such areas as partnerships and networking, biotechnology, coalition of resources, science and technology policy reviews, and coordination of work in science and technology.

GE. 2001051295 LS

ENG

1. In accordance with Economic and Social Council decision 1999/274, the Commission on Science and Technology for Development (CSTD) is to review at its fifth session the implementation of, and progress made on, decisions taken at its fourth session. Further to that decision, the present note has been prepared by the secretariat as a background document for the Commission's consideration of this agenda item. Details on activities relevant to this request are to be found also in document E/CN.16/2001/5, prepared for the current session of the Commission.
2. As part of the follow-up activities to the earlier work of the Commission on *partnerships and networking for national capacity-building*, the secretariat was requested (a) to identify and analyse best practices in partnering and networking; and (b) to create an inventory of opportunities for international science and technology partnerships and networking. In response to these requests, the secretariat undertook a study on partnerships and networking in science and technology for development. This study is before the Commission.¹
3. Furthermore, the evolving *Science and Technology for Development Network* (S&TD Net), a reference website expected to become a portal on science and technology for development partly addresses those requests. Hyperlinks pointing to some good partnerships and networking programmes in the UN system and elsewhere have already been created. The links created include the following categories: research partner locator; technology marketplace; technology partnership practices; regulations and policies facilitating international science and technology partnerships; promotion and technical assistance for networks in developing countries; and register of international science and technology networks. More sources of information on partnering and networking will be identified and included in S&TD Net, while information on those already included will be updated as often as possible. Visitors to the site are invited to suggest new websites dealing with this issue or with other issues related to science and technology for development.
4. On *biotechnology for food production*, it was recommended that the Commission, through its secretariat, initiate a dialogue that involves the public and private sectors, non-governmental organizations and specialized biotechnology centres and networks, with a view to fostering the exchange of ideas among scientists, policy-makers, representatives of industry and end-users. Also, the secretariat was requested to assist in identifying and disseminating balanced information on biotechnology, intellectual property rights and biosafety; examine case studies on these issues; prepare the next issue of the Advanced Technology Assessment System (ATAS) bulletin on biotechnology for food production; and cooperate with other international and regional organizations to build understanding and to exchange information on biosafety regulation and capacity-building, including through case studies on partnerships, biosafety, bioethics and approaches to biotechnology and intellectual property rights issues.
5. The above requests were addressed by the Commission and the secretariat through a number of activities, including four panel meetings on biotechnology; information published either on the website of UNCTAD's Division on Investment, Technology and Enterprise Development (DITE), or in DITE's two Internet discussion groups and on S&TD Net; exchange of information through publications; e-mail, faxes and other means of telecommunication; participation in meetings and other events organized by several UN

¹ E/CN.16/2001/Misc.4.

agencies and other international organizations, including OECD, NGOs and research centres.²

6. It is in this context that five papers on legal and regulatory issues in biotechnology were published on the UNCTAD/DITE website at the following URL: http://www.unctad.org/en/subsites/dite/5_intgov/content_biosafety.htm. These include an issues paper prepared by the UNCTAD secretariat, two papers on biosafety by the International Centre for Genetic Engineering and Biotechnology (ICGEB), a paper on bioethics in Cuba, another one on national biotechnology policy in Ethiopia and a country case study for Paraguay.

7. Concerning the *ATAS bulletin*, the secretariat has recently (December 2000) published an issue of the bulletin on environmentally sound technologies³ and is considering starting work on an issue on biotechnology for food production.

8. On *coalition of resources*, the secretariat was requested to finalize the publication of the reports on the coalition of resources for the application of information and communication technologies in transmissions infrastructure, education and health, and to ensure the widest dissemination of the final report. The reports on coalition of resources were prepared as part of the CSTD inter-sessional activities for the period 1995–1997 and were presented at the CSTD workshop held at the Economic Commission for Africa (ECA) in Addis Ababa from 17 to 18 November 1997. The report summarizing the studies presented at that workshop has already been prepared and will be disseminated as widely as possible, as requested by CSTD at its fourth session.

9. On *science and technology policy reviews*, it was recommended that the Commission continue to liaise with UNCTAD on science, technology and innovation policy (STIP) reviews for interested countries in order to identify options for national action. UNCTAD remains committed to the programme on STIP reviews, subject to the availability of extra-budgetary resources. Requests for STIPs have been received from the Islamic Republic of Iran, Ecuador and Peru. Meanwhile, an Investment Policy Review for Ethiopia, which includes an explicit technological component at that country's request, has been prepared. Work is proceeding on a similar review for the United Republic of Tanzania.

10. In response to the Commission's decision on the *substantive theme for the 1999–2001 inter-sessional period*, namely "national capacity-building in biotechnology", and other activities, the Commission and the secretariat organized four meetings:

- A panel and CSTD Bureau meetings, in Cambridge, Massachusetts, from 2 to 3 September 1999, in conjunction with the International Conference on Biotechnology in the Global Economy, organized and hosted by the Center for International Development and the Belfer Center for Science and International Affairs at Harvard University;
- The first panel meeting on capacity-building in biotechnology, 11–13 April 2000, Tehran, Islamic Republic of Iran;

² See E/CN.16/2001/5.

³ ATAS XII: The role of publicly funded research and publicly owned technologies in the transfer and diffusion of environmentally sound technologies. UNCTAD/ITE/IIP/9.

- The second panel meeting on legal and regulatory issues in biotechnology, 3–5 July 2000, Geneva, Switzerland;
- The third panel meeting on public awareness and participation in science-policy-making, 14–16 November 2000, Tunis, Tunisia;

Reports of these panel meetings are before the Commission.^{4 5 6}

11. On the recurrent issue of *coordination of science and technology for development in the United Nations system*, the secretariat was urged, in collaboration with other United Nations bodies, to continue efforts to establish an electronic network linking information on their activities in science and technology for development and to build awareness of scientific developments that are particularly important for fostering economic development.

12. The secretariat responded to this request by setting up the above-mentioned Science and Technology for Development Network (S&TD Net), a website centralizing continuously updated information on most activities related to science and technology for development in the United Nations system and elsewhere. More details on S&TD Net can be found in the report entitled “The activities of the commission regarding coordination of science and technology for development and other inter-sessional activities” which is before the current session.⁷

13. As to the request that it continue to issue the *regular newsletter* updating activities in the United Nations system pertaining to science and technology for development, including information on plans for and the results of the inter-sessional activities of the Commission itself, the secretariat opted to use the Internet (website and e-mail lists) as a quicker and less costly communication medium with the potential to generate more feedback. It is in this spirit that all panel meetings were announced on the DITE website and on the CSTD discussion list, as well as on STD@topica.com. Results of panel meetings were also promptly published on the web.

14. The Commission and the secretariat responded to the call to identify and take advantage of opportunities to interact closely with other bodies of the United Nations system in order to promote greater information exchange and coordination of activities in science and technology for development. The secretariat participated in the meeting of the Inter-Agency Network for Safety in Biotechnology in April 2000 in Vienna, Austria. Also, it briefed participants in the fifth session of the UNCTAD Commission on Investment, Technology and Related Financial Issues. The Chairman of the CSTD attended the OECD Working Party on Biotechnology from 2 to 4 October 2000 in Paris. In addition, the secretariat took part in the Ad Hoc Expert Group Meeting on Science and Technology for the Development of Least Development Countries (LDCs), which was held in New York from 12 to 14 March 2001.

15. The recommendation that every other year one panel meeting be held in Geneva was implemented when the second panel meeting on legal and regulatory issues in biotechnology took place. At the end of the meeting, held in Geneva from 2 to 5 July 2000, the Bureau met

⁴ E/CN.16/2001/Misc. 1.

⁵ E/CN.16/2001/Misc. 2.

⁶ E/CN.16/2001/Misc. 3.

⁷ E/CN.16/2001/5.

the Geneva-based delegations of member States and observers to discuss with them the status of the inter-sessional activities of the Commission and its efforts to coordinate the activities of the United Nations system pertaining to science and technology. Unfortunately, not many delegations attended the meeting.

16. Finally, in response to a request that it prepare a succinct analytical report on relevant activities within the United Nations system, including the outcome of the World Science Conference, the secretariat has prepared document E/CN.16/2001/5, which is before the current session for discussion under agenda item 6.



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Item 5 of the provisional agenda

BUDGET AND INTER-SESSIONAL ACTIVITIES OF THE COMMISSION

Note by the Secretariat

1. The Economic and Social Council, in resolution 1997/62, recommended that at future sessions of the Commission on Science and Technology for Development (CSTD), the report on budget and inter-sessional activities be considered under a separate agenda item. In accordance with ECOSOC decision 1999/274, which approved the provisional agenda of the fifth session of CSTD, the report on budget and inter-sessional activities is to be considered under its agenda item five.

1. The budget of the Commission

2. Under the 2000-2001 programme budget of the United Nations, CSTD has an allotment of US\$ 240,720 to be used for the travel of members to attend the fifth session, as well as for the travel and subsistence allowance for the meetings of the panels on biotechnology that were set up to prepare the inputs for the Commission's fifth session. Table 1 provides an account of the allotments and expenditures for CSTD activities under the regular budget in the 2000-2001 biennium and of the income and expenditures for CSTD inter-sessional activities covered by extrabudgetary resources.

3. In the year 2000, from the regular budget, an amount of US\$ 143,732 was spent to support the work of the panels on biotechnology, to finance travel and subsistence allowances for the panel meetings held. The remaining amount of US\$ 96,988 was earmarked to pay for the travel of the Commission members to participate in the fifth session and possibly for other activities of CSTD in the remaining part of 2001.

4. With regard to extrabudgetary resources, the available resources for CSTD work in 1999-2001 inter-sessional period came to US\$ 94,900. As shown in table 1, the amount of US\$ 22,600 was the balance from the trust fund that had been set up with contributions from the Government of the Netherlands (Dutch Fund) to cover various CSTD activities. In August 2000, an agreement was reached between the Government of the Netherlands and UNCTAD to extend the duration of this trust fund project until the end of 2000 to enable UNCTAD to finalize planned activities recommended by CSTD, i.e. preparations of materials on coalition of resources for publication. In December 2000, the UNCTAD secretariat hired a consultant for US\$ 15,000 for the preparation of a synthesis report on coalition of resources. The amount of US\$ 4,600 will be spent on printing this synthesis report and other materials on coalition of resources and US\$ 3,000 are reserved for miscellaneous purposes.

5. In addition to the above, the Trust Fund for Special Activities on Science and Technology for Development established by the Secretary-General of the United Nations on 4 April 1985 to disseminate science and technology is available for financing activities in support of the work of CSTD in the area of new and emerging technologies. From this Trust Fund, which had by 1 January 2000 the balance of US\$ 72,300, US\$ 45,000 are to be spent on consultancy, US\$ 11,500 on travel of experts, US\$ 3,500 on travel of staff, and US\$ 12,300 for external publications of studies prepared by consultants. In the second half of 2000, the secretariat hired two consultants to implement activities recommended by CSTD at its fourth session, i.e. (i) to prepare a report containing analysis of best practices in partnering and networking in science and technology-related fields and building an inventory of opportunities for international science and technology partnerships and networking (US\$ 10,000); and (ii) to create an electronic science and technology for development network with a view to improving information exchange on technology-related issues, knowledge diffusion

Table 1
Summary of overall CSTD budget
1 January 2000 – 28 February 2001
(in US\$)

I. REGULAR BUDGET

Item	Allotment	Expenditure	Committed	Planned	Balance
1. Travel of participants to the 5 th session	96,988.00			96,988.00	
Sub-total	96,988.00			96,988.00	
2. Panels on biotechnology	143,732.00	143,732.00			
Sub-total	143,732.00	143,732.00			
Regular budget total	240,720.00	143,732.00		96,988.00	

II. EXTRABUDGETARY RESOURCES

Item	Income	Expenditure	Committed	Planned	Balance
A. Dutch Trust Fund	22,600.00				
1. Consultants		15,000.00			
2. Printing of reports				4,600.00	
3. Miscellaneous				3,000.00	
Dutch Trust Fund sub-total	22,600.00	15,000.00		7,600.00	
B. Trust Fund for Special Activities on Science and Technology for Development	72,300.00				
1. Consultants	45,000.00		22,000.00		23,000.00
2. Ad Hoc experts	11,500.00				11,500.00
3. Travel of staff	3,500.00	3,500.00			
4. External printing	12,300.00				12,300.00
Trust Fund for Special Activities Sub total	72,300.00	3,500.00	22,000.00		46,800.00
Extrabudgetary total	94,900.00	18,500.00	22,000.00	7,600.00	46,800.00

and continuous learning in UNCTAD, in other UN agencies and in Member States (US\$ 12,000).

II. Inter-sessional activities of the Commission

May 1999 – February 2001

6. In carrying out its inter-sessional work, the Commission held its first Bureau meeting and a preparatory meeting of the panels on biotechnology in Cambridge, Massachusetts, USA, from 2 to 4 September 1999. These meetings were held in conjunction with the International Conference on Biotechnology in the Global Economy, organized and hosted by the Center for International Development (CID) and the Delfer Center for Science and International Affairs at Harvard University. The purpose of the meeting of the Bureau and of the preparatory meeting referred to above was: (i) to launch the inter-sessional work of the Commission on national capacity-building in biotechnology; and (ii) to discuss the organization of panels and the subthemes upon which each of the three panel meetings would focus. The mission cost of CSTD members was covered from the CSTD regular budget for the 1998-1999 biennium that remained after the fourth session of the Commission.

7. Three panel meetings on various aspects of biotechnology were held in 2000 with support from the CSTD 2000-2001 budget. These were:

- ◆ Panel on capacity-building in biotechnology, Tehran, Islamic Republic of Iran, 11-13 April 2000;
- ◆ Panel on legal and regulatory issues in biotechnology, Geneva, Switzerland, 3-5 July 2000;
- ◆ Panel on public awareness and participation in science policy-making in biotechnology, Tunis, Tunisia, 14-16 November 2000.

8. The annex provides details on the agendas and participants of these three panel meetings.

9. Additional information on inter-sessional activities of the Commission is also contained in the documentation prepared for agenda items 3 and 6 of the fifth session of the Commission.

Annex

INTER-SESSIONAL ACTIVITIES OF CSTD

Panel on capacity building in biotechnology

Tehran, Islamic Republic of Iran

11-13 April 2000

Agenda

1. Opening statement
2. Consideration of main items on capacity building in biotechnology
 - (a) Item 1: National policies and institutional capacity-building in biotechnology: Presentations of country case studies by members of CSTD
 - (b) Item 2: Managing and regulating biotechnology
 - (c) Item 3: Monitoring and assessing the impact of biotechnology applications in developing countries
 - (d) Item 4: The role of centres of excellence in building capacity in biotechnology.
3. Identification of critical issues in capacity building in biotechnology and follow-up actions
4. Panel recommendations for consideration by CSTD at its fifth session in 2001.

Participants

Members:

Dr. Pedro Teta
Professor Sun Wanhu
Dr. Liu Jun
Dr. Joseph R. Cobbinah
Dr. Lena Tsipouri
Mr. Cece Kpohomou
Dr. Mahmoud Molanejad
Dr. Sang-Ki Rhee
Dr. Tariq-ur-Rahman
Professor Štefan Moravek
Professor Vijay Kumar
Dr. Titus Mteleka

United Nations Agencies

Mr. Galileo Violini, UNESCO
Mr. Fereydon Bokaei, UNDP
Dr. Ali Y. Hakimi, FAO
Mr. Hossein Fadaei, UNEP

Resource Persons

Dr. Peter Gregory
Dr. John Mugabe
Professor Lynn K. Mytelka

Other Speakers

Professor Štefan Morávek
Dr. S.A. Motamedi
Dr. Mahmoud Molanejad
Dr. N. Moazami
Dr. M. H. Sanati

Secretariat

Ms. H. Argalias
Mr. M. Hamdi

Panel on legal and regulatory issues in biotechnology

Geneva, 3-5 July 2000

Agenda

1. Opening statements
2. Managing the opportunities and challenges
3. Technology transfer and diffusion
4. Intellectual property rights
5. Biosafety and bioethics
6. Conclusions and recommendations

Members

Professor Bernd Michael Rode
Ms. Marleen Bosschaerts
Mr. Syargei Katsko
Professor H. Hogbe Nlend
Dr. José Rodríguez Dueñas
Mr. Mulugeta
Mr. Eberhard Hauser
Dr. Joseph R. Cobbinah
Mr. Cécé Kpoghomou

Professor Dr. Yoedoro Soedarsono
Dr. M. Molanejad
Dr. Arnoldo K. Ventura
Dr. KongRae Lee
Dr. Tariq-ur Rahman
Mr. Victorio Oxilia
Ms. Rolanda Predescu
Professor Štefan Morávek
Mr. D. Jesús Martínez Frias
Professor Dr. Vijaya Kumar
Dr. Ali Abaab

Permanent Missions in Geneva

Mr. Arnaldo Abeti, Italy
Mr. Felix Grishaev, Russian Federation
Mr. David José Vivas Eugui, Venezuela

Resource Persons

Dr. Ivan Rodrigo Artunduaga Salas
Professor Gert-Jan van Ommen
Professor Calestour Juma

Observers and Invited Guests

Mr. Sam Johnston
Ms. Edda Rossi
Mr. Giovanni Ferraiolo
Mme. Anne-Marie Colandrea
Père Masimo de Gregori

Panel on public awareness and participation in science policy-making in biotechnology

Tunis, Tunisia, 14-16 November 2000

Agenda

1. Opening Statements

2. Background
 - (a) Biotechnology and the public in Europe
 - (b) Science communication in Europe
 - (c) Raising public awareness about biotechnology in a developing country
3. Country reports
4. Discussion and emerging key issues
5. Conclusions and recommendations

Participants

Members

Dr. Justino Manuel Vanda
Dr. Pedro S. Teta
Professor Bernd Michael Rode
Ms. Marilia Sardenberg Z. Gonçalves
Professor Henri Hogbe Nlend
Mr. Joseph Antoine Ngalani
Dr. Ricardo de la Caridad Silva Rodriguez
Mr. Shumu Teferra
Ms. Lena Tsipouri
Mrs. Ma. Angelina M. Sta. Catalina
Mr. Armando Trigo de Abreu
Mrs. Natalia Stepanova
Mr. Štefan Morávek
Dr. Titus Mteleka
Mr. Joatham Kapasi-Kakama

Resource Persons

Professor Richard Braun
Professor Vladimir Bales
Mr. George Essegbey

United Nations Agencies

Ms. Lynn K. Mytelka, UNU/INTECH
Dr. Nicole Biros, WHO

Observers and Invited Guests

Dr. Eng. Elissan Shrytech
H.E. Mr. Ivor Rawlinson

Dr. Hamed Al-Awfi
Professor Radhouane Ellouz
Mr. Fatiou Foukouron
Mr. Oliver Wolf

Secretariat

Mr. M. Hamdi
Ms. K. Stokes
Ms. L. Mercado



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**ACTIVITIES OF THE COMMISSION REGARDING THE
COORDINATION OF SCIENCE AND TECHNOLOGY FOR
DEVELOPMENT AND OTHER INTER-SESSIONAL ACTIVITIES**

Note by the secretariat

Executive summary

The Economic and Social Council, in resolution 1999/61, requested the secretariat of the Commission to continue efforts, in collaboration with other United Nations bodies, to establish an electronic network linking information on their activities in science and technology for development and to build awareness of scientific developments that are particularly important for fostering economic and social development. It also called upon the secretariat and the Bureau of the Commission to interact closely with bodies of the United Nations system in order to promote greater information exchange and coordination of activities in science and technology for development. This note describes the progress made in responding to those requests. Emphasis is placed on the Science and Technology for Development Network as it responds to the above requests. It also reports on the outcome of the World Science Conference.

INTRODUCTION

1. In accordance with decision 1999/274 of the Economic and Social Council, the Commission on Science and Technology for Development (CSTD) is to consider, at its fifth session, under agenda item 6, the question of the activities of the CSTD regarding the coordination of science and technology for development.

2. Since its establishment in 1992, the CSTD has paid particular and continuous attention to the coordination of the activities of the United Nations system in the area of science and technology for development. At its fourth session, it revisited the issue on the basis of a note prepared by the UNCTAD secretariat (E/CN.16/1999/8). In the course of its deliberations, the CSTD noted that playing the role of coordinator within the United Nations system has always been, and will continue to be, a complicated task. For better coordination of science and technology, the CSTD should seek more inter-agency interaction not only to fulfil its mandate as coordinator of science and technology activities more effectively, but also to provide leadership and direction in this critical area. The Bureau was advised to be more proactive, and improvement was requested in networking communication among CSTD experts and UN agencies during the inter-sessional periods. Additional steps need to be taken to encourage the participation of other United Nations organizations in CSTD panels.

3. The Economic and Social Council (ECOSOC) took up the issue of coordination in its substantive session in July 1999. In its resolution 1999/61, it urged the secretariat of the Commission to continue its efforts, in collaboration with other United Nations bodies, including regional commissions and the Ad Hoc Open-ended Working Group on Informatics, to establish an electronic network linking information on their activities in science and technology for development and to build awareness of scientific developments that are particularly important for fostering economic and social development.

4. In the same resolution, ECOSOC called upon the secretariat and the Bureau of the Commission to identify and take advantage of opportunities to interact closely with bodies of the United Nations system in order to promote greater information exchange and coordination of activities in science and technology for development, including participation by the secretariat in the relevant coordination meetings of the Administrative Committee on Coordination's Consultative Committee on Substantive Questions (Operational Activities).

5. Finally, the ECOSOC recommended that every other year one panel meeting be held in Geneva, following which the Bureau would meet the Geneva-based delegations of member States and observers for one day to discuss the status of inter-sessional activities of the Commission and its efforts to coordinate activities of the United Nations system pertaining to science and technology for development.

6. This note describes the progress made in responding to these decisions. Emphasis will be placed on the Science and Technology for Development Network as it responds to many of the requests mentioned above. It also reports on the outcome of the World Science Conference.

OUTCOME OF THE WORLD CONFERENCE ON SCIENCE

7. The world has witnessed increased diffusion of science-based technologies that have far-reaching implications for economic and social development. This was highlighted by the World Conference on Science, held in Budapest, Hungary, from 26 June to 1 July 1999. The Conference involved national Governments and institutions, educational and research establishments, members of the scientific community, the industrial sector, intergovernmental organizations (IGOs) and international scientific non-governmental organizations (NGOs). The outcome of the conference is embodied in two principal documents:¹

- (a) The Declaration on Science and the Use of Scientific Knowledge, which underscores the political commitments by the international community to scientific endeavour and to finding solutions to problems at the interface between science and society;
- (b) The Science Agenda – Framework for Action, which contains specific commitments and recommendations with regard to capacity-building in science and the use of science for sustainable development.

8. The Declaration emphasizes *inter alia* the following issues:

- (a) Science for knowledge and knowledge for progress;
- (b) Science for peace;
- (c) Science for development, which implies the application of scientific knowledge for the development of technology that has wide-ranging development implications for different countries;
- (d) Science in society and science for society, which implies that the use of scientific knowledge should aim at the welfare of humankind, including reduction of poverty and respect for the dignity and rights of human beings.

9. As regards the Plan for Action adopted by the Conference, it identified a number of priority areas and actors that could help to attain the objectives of the Declaration. A major factor is the strengthening of the role of fundamental research. The message is for countries to continue to carry out fundamental research and provide education in different science disciplines. Public authorities, private companies, universities and research laboratories have a responsibility in this domain. Both the public sector and the private sector have a major role to play in this regard.

10. New funding mechanisms should be explored to enable those actors to generate and diffuse scientific research, taking into account the context prevailing in developed and developing countries. Attention was also directed to the sharing of scientific information and knowledge among countries, drawing on the use of information technology services that facilitate the collection and dissemination of information. Furthermore, partnerships have been established using this new technology, including networks for research and training and cooperative arrangements between research communities in developed and developing countries.

¹ UNESCO, *Science for the 21st Century: A New Commitment*, Paris, 2000.

11. As regards science for peace and development, emphasis was placed on science for the attainment of basic human needs, including food, water, shelter and access to health care. It is against this background that a case for supporting science and development for developing countries is made. A related issue dealt with in this framework is the interrelationships between science, environment and sustainable development. This has been highlighted, given the great challenges that face the international community in the future. Another issue underlined in the Plan of Action is the interrelationship between science and technology. This relationship is becoming increasingly important with the advent of new technology. All countries should develop a science base, taking into account the level of their economic development. On the other hand, science policy should be formulated taking into account the protection of intellectual property rights.

12. The Plan of Action has also highlighted the role of science in society and science for society. In this respect, social requirements and human dignity were emphasized, which implies that science should be at the service of humanity as a whole. It should contribute to improving the quality of life for present and future generations. The scientific community, governments and other actors are urged to commit themselves to social and human dignity. The popularization of science, including the increasing participation of society in science-related work, should be encouraged. Participation in the planning, implementation and assessment of scientific research should be promoted.

13. The Declaration on Science and the Use of Scientific Knowledge and the Science Agenda – Framework of Action are important tools for decision makers in their efforts to promote capacity-building and international cooperation in science. Together, they also provide a follow-up framework of action at the national, regional and international levels for the generation, development and diffusion of scientific knowledge, which is intimately related to the building of technology capacity.

Science and Technology for Development Network

14. On 25 April 2000, the Advisory Committee on Coordination (ACC) issued a statement on information technology and development in which it reaffirmed the critical role of information technology as a tool for knowledge-sharing and development, as well as a means for collaborative action in the UN system. It called for a comprehensive and coordinated system-wide approach to building an effective knowledge acquisition and dissemination capacity. Executive heads requested, *inter alia*, to “organize a system-wide community of IT experts and users through innovative networking arrangements, as a system-wide resource facility and consultancy service for information on options, costs, good practices, and emerging developments; for use by organizations of the system for their IT needs and for operational activities for development.”

15. In addition, in its resolution A/RES/54/201, the General Assembly called for “proposals for strengthening the coordination mechanisms of the Commission on Science and Technology for Development within the United Nations Conference on Trade and Development in order to ensure coordination of the various efforts and activities in the area of new and innovative technologies, in particular information and communication technologies, and their applications, such as in electronic commerce, with the objective of promoting complementarities of activities within the United Nations System”. In response to

this request, UNCTAD prepared a report² in which it suggested the setting up of a knowledge and technology network for development.

16. For about four years, the UNCTAD secretariat has been taking steps to establish electronic linkages as part of its dissemination activities. These include the launching of a website for the Division on Investment, Technology and Enterprise Development in 1998 and two Internet discussion lists in 1999 (STD@topica.com and CSTD@topica.com). The DITE website includes information on the Division's activities in the areas of investment, enterprise development and technology for development. Information published on science and technology within UNCTAD includes meeting reports of (past, present and future), proceedings of seminars, publications (a list of recent DITE documents with their table of contents or a summary for most of them, and the full text of other papers), the main UN resolutions on science and technology, a list of current members of the CSTD, etc.

17. The UNCTAD secretariat, in collaboration with other UN bodies, including regional commissions, has initiated the establishment of the Science and Technology for Development Network (S&TD Net) (see Annex I) with the following objectives:

- Providing information on activities in the area of science and technology for development (projects, policies, programmes, networking and partnership opportunities, publications available on-line, etc.) within the United Nations system, other multilateral and bilateral development institutions, NGOs, etc.;
- Building awareness of scientific and technological developments that are of particular importance for fostering economic and social development in member States;
- Identification and dissemination of best practices in the assessment, transfer, adaptation, development and diffusion of technology for development purposes.

18. On 10 November 2000, the Secretary-General of UNCTAD sent a letter to the members of the ACC requesting them to provide information on their activities on science and technology for development for inclusion in the S&TD Net website. A summary of the content of that initial version of the network is attached as an annex to this note.

19. Preliminary responses from UN agencies can be summarized as follows:

- (a) The Economic Commission for Africa sent a letter describing the three initiatives it has undertaken to assist member States in the area of science and technology.
- (b) The UN Economic Commission for Europe sent a message summarizing its activities in science and technology with an indication of related websites.
- (c) The UN Research Institute for Social Development provided a short summary of its research projects in the area of information and social development.

- (d) The International Monetary Fund provided an insight into its specialized technical assistance in the area of information technology.
- (e) UNIDO responded with a presentation of the UNIDO International Technology Centres and their Networks, and of the UNIDO Exchange as a new electronic platform linking industrial development agents with UNIDO and its networks.
- (f) The UN High Commissioner for Human Rights provided information on its activities concerning human rights and scientific developments.
- (g) The World Intellectual Property Organization provided an overview of its work in the area of information technology for development.
- (h) The International Labour Organization provided information on its related activities with emphasis on its publication *World Employment Report 2001: Life at Work in the Information Economy*.
- (i) The World Trade Organization described its contribution to science and technology for development, especially in relation to the implementation of the relevant provisions of the WTO Agreements and to the use of information technology to assist developing and least developed countries.
- (j) The Department of Economic and Social Affairs of the UN secretariat sent a description of its efforts in providing a range of technical cooperation services for advising and supporting countries in implementing development strategies.

20. As more responses are received from UN departments and specialized agencies, more data are incorporated and more links are created within S&TD Net. S&TD Net is thus expected to evolve into a directory of those active in the field and, ultimately, into a first portal on science and technology for development with continuously expanding and updated information on best practices, knowledge, learning, networking and financing opportunities for science and technology.

21. In addition to setting up S&TD Net, the secretariat interacted with other United Nations bodies through participation in several joint meetings and on-line discussions. For example, a representative of the secretariat attended a meeting of the Inter-Agency Network for Safety in Biotechnology³ (IANB) held at UNIDO headquarters in Vienna, Austria, in April 2000. Since then, the activities of the secretariat have been publicized in the IANB newsletter.

22. With regard to the Bureau, the Chairman of the CSTD participated in the OECD Working Party on Biotechnology, held in Paris from 2 to 4 October 2000. In his address, he briefed the participants on the programme and the activities of the CSTD panels.

³ The Inter-Agency Network for Safety in Biotechnology includes participants from CGIR, CBD, FAO, OECD, OIE, UNCTAD, UNIDO, WHO and WTO.

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² A/55/96-E/2000/84 as of 28 June 2000.

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³ The Inter-Agency Network for Safety in Biotechnology includes participants from CGIR, CBD, FAO, OECD, OIE, UNCTAD, UNIDO, WHO and WTO.

23. The recommendation by the Economic and Social Council that the CSTD collaborate closely with other United Nations bodies was fully taken into consideration by the CSTD in carrying out its inter-sessional activities. Various United Nations bodies and other international organizations were invited to participate in the CSTD panels on biotechnology. A number of organizations responded positively by appointing representatives to the CSTD panels. The panels benefited from the participation of, and substantive inputs provided by, representatives of various United Nations agencies and institutes, including the United Nations University Institute for New Technologies, the World Health Organization, the United Nations Environment Programme, the United Nations Educational, Scientific and Cultural Organization, the International Centre for Genetic Engineering and Biotechnology, the Convention on Biological Diversity and UNCTAD. The costs of those contributions, in terms of human resources and travel, were borne by the respective organizations.

24. Also, as requested, the CSTD held its second panel meeting in Geneva — on “legal and regulatory issues in biotechnology”, — from 3 to 5 July 2000. The Bureau briefed the delegations of member States and observers on the status of the CSTD’s inter-sessional activities. Furthermore, the secretariat briefed participants in the fifth session of the Commission on Investment, Technology and Related Financial Issues (Geneva, 12–16 February 2001) on the activities of the CSTD.

25. Finally, an important decision relevant to coordination issues regarding science and technology in the UN system is the creation by the UN Secretary-General of the Information and Communication Technology Task Force and the appointment of the Advisory Group supporting it. The Task Force was established following a recommendation by the Ad Hoc Open-ended Working Group on Informatics. The recommendation was endorsed by ECOSOC in July 2000. In November 2000, the Secretary-General appointed the former President of Costa Rica, Mr. Jose Maria Figueres-Olsen, as his special representative and head of the Advisory Group on Information and Communication Technologies. The Advisory Group, composed of 21 personalities from the public and private sectors of all continents (see list in annex II), will draw up the specific modalities for the Task Force, in which UNCTAD is expected to participate.

ANNEX I

Science and Technology for Development Network

Co-ordination of Information on Science & Technology for Development

Site map	Description
CSTD Activities	Here you will find out about the activities of the UN Commission on Science and Technology for Development (CSTD).
About S&TD Network	This page describes the objectives and activities of the S&TD Network.
A-Z Index	A-Z index is limited to the activities of UN science and technology organizations.
<u>Activities of Organizations on Science & Technology:</u>	
• <u>UN</u> • <u>Inter-governmental</u> • <u>NGOs</u> • <u>National</u>	This page is a one-stop shop for information about the work of various science and technology organizations.
Best Practices in Technology Transfer	This page provides information about web resources for best practices in technology transfer as well as lessons and ideas collected from various workshops and conferences.
<u>International Networks & Technology Partnerships Locator</u>	This page provides information for partnering and networking in science and technology. The <i>Research partner</i> provides information for researchers to enable them to exchange information about their research work and proposals. Researchers can easily find other researchers that work in related fields or that are looking for partnerships, and contact them through the e-mail. The research locator helps users to search for partners on the basis of countries and fields. Similarly, the <i>Technology Marketplace</i> helps information seekers to find new products or services. To find information on best practices in partnering and networking as well as country experiences in technology partnerships, the <i>Technology Partnership Practices</i> page is an excellent place to begin. The <i>Regulations and Policies Facilitating S&T Partnership</i> page is an inventory of international S&T cooperation agreements.
• <u>Research Partner Locator</u> • <u>Technology Marketplace</u> • <u>Technology Partnership Practices:</u> ◦ <u>Best Practices in Partnering and Networking</u> ◦ <u>Country Experiences</u> • <u>Regulations & Policies Facilitating International S&T Partnerships</u> • <u>Promotion & Technical</u>	<i>Promotion & Technical Assistance for Networks in Developing Countries</i> page describes the activities of the S&TD Network in promoting knowledge networks in developing countries. An inventory of science and technology networks and their activities is presented on the page entitled <i>Register of International Science and Technology Networks</i>. Inquiries about technical issues in partnering as well as information about related web resources are addressed via the <i>Technology Partnership Enquiries: where can I find information</i> page.

<u>Assistance for Networks in Developing Countries</u> • Register of International Science & Technology Networks • Technology Partnership Enquiries: where can I find information?	
<u>Science & Technology Diplomacy Initiative</u>	This page describes how the S&T Diplomacy Programme will provide developing countries with succinct technology diplomacy briefs on important science and technology related treaties, protocols and international initiatives.
<u>Funds & Grants for Technology Development</u>	An inventory of organizations that provide financial support for science and technology projects can be accessed via the Funds & Grants for Technology Development page.
<u>New Technologies, Reports & Research Findings</u> • <u>Biotechnology</u> • Information & Communication • General Reports & Issues Paper • Energy • Environment • Online Exhibition	Awareness of the growing number of innovations, research findings and new technologies is the main objective of this page. Trends in various technology fields are comprehensively recorded on this page and presented to information users in an easily accessible way. Also on this page is an inventory of reports and issues papers of relevant committees of various international organizations on science and technology.
<u>Science & Technology News and Events</u>	News updates from various international media and press releases from research centres are monitored via this page. It covers forthcoming science and technology events.
<u>Technology of the Month</u>	The Technology of the Month page contains an in-depth analysis of transferable technologies and interviews with technology experts.
<u>UNCTAD's Publications</u>	This page contains the lists of all UNCTAD publications and reports of the CSTD. Users can find information on how to order books published by UNCTAD. The CSTD reports that contain useful initiatives on science and technology issues can be accessed easily via this page.
<u>Contact</u>	The contact page contains two types of e-mail addresses, one for contacting the S&TD Network and the other for sending opinions on the discussion lists and suggestions for improving the website.
<u>Disclaimer</u>	The disclaimer notice is essential for viewers to understand the general implications of information presented on this website.
<u>Search</u>	The search engine is still under construction.

ANNEX II

UN Secretary-General's Information and Communication Technology Advisory Group

José María Figueres-Olsen	Special Representative, former President of the Republic of (Costa Rica)
Zoë Baird	President, Markle Foundation (United States)
Eric Benhamou	Chief Executive Officer, 3Com (United States)
Manuel Castells	Professor, University of California at Berkeley (Spain)
Vinton Cerf/Senior	Vice president, MCI WorldCom (United States)
John T. Chambers	President and Chief Executive Officer, Cisco Systems (United States)
Carleton Fiorina	President and Chief Executive Officer, Hewlett-Packard (United States)
Toomas Ilves	Minister of Foreign Affairs (Estonia)
Jiang Mian-heng	Vice President, Academy of Science (China)
Andrei Korotkov	Head of Government Information Department (Russia Federation)
Richard Li	Chairman and Chief Executive Officer, Pacific Century Group (China)
Erkki Liikanen	European Union Commissioner for Enterprise and Information Society, European Commission (Finland)
Jay Naidoo	President of South African Development Bank (South Africa)
Yoshiji Nogami	Deputy Minister of Foreign Affairs (Japan)
Jorma Ollila	Chairman and Chief Executive Officer, Nokia Corporation (Finland)
Sam Pitroda	Chairman and Chief Executive Officer, WorldTel (India)
Nii Quaynor	Chairman and Chief Executive Officer, Ghana Internet Corporation (Ghana)
Tadao Takahashi	Ministry of Science and Technology (Brazil)
Serge Tchuruk	Chairman and Chief Executive Officer, Alcatel (France)
Makarim Wibisono	President of the Economic and Social Council (Indonesia)
Muhamed Yunus	Chairman and Chief Executive Officer, Grameen Bank (Bangladesh)